

# BAHRIA CLASSIFICATION SOCIETY



## RULES FOR THE CLASSIFICATION OF NAVAL SHIPS

### Chapter 101 – Classification and Surveys

**JULY 2022**

This latest edition incorporates all rule changes. The latest revisions are shown with a vertical line. The section title is framed if the section is revised completely. Changes after the publication of the rule are written in red color.

Unless otherwise specified, these Rules apply to ships for which the date of contract for construction is on or after JULY 2022

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## SECTION 1

### CLASSIFICATION

#### A. Scope, Application

##### 1. Scope, Prerequisites

**1.1** The Rules for Classification and Surveys of Naval Ships cover the Classification of surface ships as defined in 2. and in Section 2, C.

**"Classification"** essentially means the

- Examination of design documents, construction plans and material specifications in comparison with the applicable Rules, Guidelines and Regulations according to B.
- Supervision of construction/fabrication of new buildings or conversions.
- Supervision of ships in service by regular surveys in order to ascertain that a condition is maintained, which complies with Class requirements. See also E. and Section 3.

**1.2.** Classification covers the ship's hull and machinery including electrical installations as well as special equipment and installations as far as agreed in the building specification between the Naval Authority and the Shipyard. Classification aims primarily at ensuring reliability of the hull structure and machinery systems on board resulting in an adequate level of safety of personnel and environmental protection. However, Classification is not intended to ensure the effectiveness of the intended missions.

**1.3.** Structures, machinery and equipment determining the type of ship are subject to examination within the scope of Classification, in accordance with the Character of Classification and affixed Notations.

Other systems and components may be included in the Classification and/or certification procedure upon request of the Naval Authority.

**1.4.** Particular systems and components for military use may be exempted from Classification, depending on the indication of the Naval Authority and on legal or contractual restrictions. However, influences from such systems possibly affecting safety, e.g. static and dynamic loads, explosion or fire hazards, shall be taken into account in the design appraisal for Classification.

**1.5.** Design appraisal within the Classification procedure will normally include the review or recalculation of stability investigations. This requires the relevant information, on (e.g. combat-related) damages to be taken into account, to be submitted by the Naval Authority.

**1.6.** It is assumed that all parties involved in the planning and design, materials and components production and installation have the professional qualifications required and/or suitable facilities/equipment for fabrication. This will normally be established or confirmed by means of a certified quality assurance management system in accordance with ISO 9000, AQAP or equivalent.

##### 2. Application

**2.1** These Rules apply to seagoing surface ships and craft intended for naval activities.

**2.2** Classification according to these Rules applies primarily to new buildings constructed under

surveillance of **BCS**. Classification may also be applied to existing ships by a survey for Admission to Class, if sufficient documentation is available, see E.2.

### 3. Confidentiality

**3.1 BCS** maintains confidentiality with respect to all documents and other kinds of information received in connection with the orders entrusted to **BCS**.

**3.2 BCS** shall comply with the security procedures agreed upon with the Naval Authority.

**3.3 BCS** will instruct its personnel engaged in a naval project to follow the security procedures, including the necessary safe handling and storage of confidential information and documentation as agreed upon with the Naval Authority.

## B. Rules, Guidelines and Regulations

### 1. BCS Rules

**1.1** The **BCS - Naval Ship Rules**, (see Table 1.1) will be applied for structural elements and for components of the machinery and electrical installation of naval ships, subject to agreement between the Naval Authority and the Shipyard for the Classification order to **BCS**.

**Table 1.1 Rules for Classification and Construction of Naval Ships**

Naval Ship Rules	
Chapter	Title
102	Hull Structures and Ship Equipment
103	Special materials for Naval Ships
104	Propulsion Plants
105	Electrical Installations
106	Automation
107	Ship Operation Installations and Auxiliary Systems

Regarding weapons and sensors normally only their recoil forces must be considered when dimensioning the relevant foundations.

**1.2** Additional **BCS** Rules and Guidelines which may be used for naval ships, without pretension for completeness, are listed in Table 1.2.

**1.3** Ships, not in compliance with 1.1 and 1.2 may be classed, provided that their structural elements or any installations are found to be equivalent for the respective Character of Classification including Notations regarding design, function and safety.

**1.4** If the Class Notation **NSC** shall be assigned, detailed compliance with the different Chapters of the Naval Ship Code can be certified by **BCS**.

## 2. Other construction rules and Maritime Regulations

**2.1** The review and appraisal of design and construction particulars by **BCS** will be exclusively based on rules and guidelines, agreed upon in the specification of the Classification contract between the Naval Authority or the Shipyard and **BCS**.

**2.2** In addition, national construction rules for naval ships may be applied upon agreement with the relevant Authority and if defined in the specification of the Classification contract between the Naval Authority or the Shipyard and **BCS**.

**2.3** The application of national regulations of the respective Flag State to the naval ship under consideration shall be checked by the Naval Authority and the Shipyard and agreed upon in the particular case.

**2.4** IMO Conventions, Resolutions, Codes, etc., may be applicable in certain cases and/or for certain aspects, e. g. pollution prevention. Details shall be clarified and laid down in the Classification specification in the particular case.

## 3. Industry Codes, Standards, etc.

Internationally recognized Standards and Codes published by military organizations, national industry organizations or standardization institutions may be used upon agreement in particular cases as a design and fabrication basis.

Examples: STANAG, MIL-STD, DEF, DIN, IEC, ISO.

C	25	Guidelines for Machinery Condition Monitoring
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## C. Definitions

### 1. Classification

The term "Classification" is used as defined under A.

1.1. Classification is documented by a valid Certificate to be carried on board of the ship.

For validity see D.2.2.

### 2. Class Designation

The Class designation consists in:

-

- The **Character of Classification**, i.e. a sequence of abbreviations indicating the extent of compliance with the applicable Rules and the duration of the Class period.

- **Notations**, affixed to the Character of Classification, indicating particular features capability, service restrictions or special equipment and installations included in the Classification.

For details see Section 2.

**Table 1.2 Relevant Chapters of BCS Rules and Guidelines**

Part	Chapter	Rule
A	2	Materials
A	3	Welding of Hull Structures
C	7	High Speed Craft
C	21	Bridge Design
C	22	Dynamic Positioning Systems
C	23	Redundant Propulsion and Steering Systems

### 3. Period of Class

Period of Class **p** is the nominal interval [years] between two Class Renewal Surveys, see Section 2, B.2. and Section 3, B.1.4.

### 4. Naval Authority

Naval Authority is the State Authority respectively an authorized institution responsible for the definition, purchase and operation of the naval ship. In some cases the above mentioned responsibilities are split up between different Authorities or Institutions.

### 5. Naval Ship

A naval ship is a vessel designed and operated for naval and related activities commanded by a Navy or Coast Guard.

### 6. Shipyard

The Shipyard is the contractual partner of the Naval Authority, entrusted with managing the design, construction and equipment of the naval ship, generally together with a series of subcontractors and manufacturers.

### 7. Building Specification

The building specification is part of the building contract between the Naval Authority and the Shipyard and specifies the technical parameters and all other details for the construction of the naval ship.

### 8. BCS

**BCS** means Head Office of Bahria Classification Society in Karachi/Pakistan.

**9. Classification Specification**

The Classification specification is part of the Classification contract between the Shipyard and **BCS** during construction and between the Naval Authority and **BCS** after delivery. It specifies the Rules, guidelines and regulations forming the technical basis of the Classification as well as scope and necessary details of the Classification and survey procedures and refers to the building specifications as far as necessary.

**10. Client's Responsibilities**

**10.1** It is the responsibility of the Owners/ operators, designers, builders and installers to familiarize themselves and to abide by the appropriate sections of the Rules.

**D. Validity of Class****1. Period of Class**

**1.1** The hull, the machinery as well as special equipment and installations classed have the same period of Class; see also Section 2, B.2.

**1.2** For reassignment of Class after conversions see 3.4.

**2. Prerequisites for Validity of Class**

**2.1** The Class assigned by **BCS** is only valid under the provision that the operating conditions are complied with as stated in the Class Certificate, the operation manual and/or as additionally agreed between the Naval Authority and **BCS**.

**2.2** The Class continues to be valid, provided that the hull, machinery as well as special equipment and installations classed are subject to all surveys stipulated, see Section 3, and that any repairs required as a consequence of such a survey are carried out to the satisfaction of **BCS**.

If some special equipment classed is not subjected to the prescribed surveys or is no longer intended to be

carried on board, the Notation for that equipment only will be suspended or withdrawn.

**2.3 BCS** Head Office or one of the **BCS** representations are to be immediately informed about any average, damage or deficiency to the hull, machinery or equipment classed, where these may be of relevance to the ship's Class and safety. A survey will have to be arranged for a date not later than that of the ship's arrival at the next port.

If the survey reveals that the ship's Class has been affected, it will be maintained only on condition that the repairs or modifications demanded by **BCS** are carried out within the period and under the operating conditions specified by the Surveyor. Until full settlement of these demands the Class will be restricted.

**2.4** Any damage or excessive wastage beyond allowable limits to side shell frames, their end attachments and/or adjacent shell plating, the deck structure and deck plating, the bottom structure and bottom plating, the watertight or oiltight bulkheads and the hatch covers or coamings that affect a ship's Class, is to be permanently repaired immediately after the survey.

For locations where adequate repair facilities are not available, consideration may be given to allow a ship to proceed directly to a repair yard. This may require temporary repairs for the intended voyage.

Damages or excessive wastage at the areas noted above and not immediately affecting the vessel's structural or watertight / weathertight integrity may be temporarily repaired for a period to be defined.

**2.5** The spare parts specified to be carried on board must be in a condition ensuring unrestricted usability.

**2.6** Apart from the Class Certificate, any other documentation of significance for classification, such as:

- Reports on surveys previously performed,

- Maintenance schedules to be observed by the Naval Authority, as agreed with **BCS**,
- Approved drawings and other documentation handed out to the Naval Authority and containing particulars or instructions of significance in respect of the Classification requirements, e.g. use of special steel grades, list of spare parts,

is to be kept on board and made available to the Surveyor on request.

**2.7** Weapons and other systems for military use may be exempted from Classification, see A. 1.4. However, any changes in such systems that may affect the safety of operations and hence validity of the ship's Class, including its classified installations, shall be notified to **BCS** in due course. This applies particularly to cases, where system changes lead to structural conversions or important changes in the machinery and electrical installation.

**2.8** **BCS** provide a notification system to remind the Naval Authority of surveys becoming due, or of any other matters of interest or urgency in connection with the Classification of the ship. However, in principle it remains the responsibility of the Naval Authority to comply with the Class conditions and to observe the dates for the prescribed surveys.

### 3. Repairs, Conversions

**3.1** Where parts or components are damaged or worn to such an extent that they no longer comply with the Class requirements, they are to be repaired or replaced. The damaged parts shall be made accessible for inspection so that the kind and extent of the damage can be thoroughly examined.

**3.2** Repairs and conversions of the ship's hull, machinery as well as special equipment and installations classed have to be carried out under the

supervision of **BCS** to ensure compliance with the Rules and continued validity of Class. The repair measures are to be agreed with the Surveyor such as to render possible confirmation of the Class, without reservations and Conditions of Class, upon completion of the repairs.

Generally, a confirmation of Class with reservations or conditions of Class, e.g. in case of temporary repairs, requires to be approved by **BCS** Head Office.

**3.3** The areas affected by repairs or conversion shall be treated in the same way as for new buildings. However, experience and technical knowledge gathered since the ship was built shall be taken into account.

**3.4** If following major conversions a new Character of Classification and/or new Notations are assigned so that the Class Certificate has to be reissued, commencement of a new period of Class may be agreed upon.

### 4. Suspension and/or Withdrawal of Class

**4.1** If the Naval Authority is not interested in maintenance of Class of the ship or any of its special equipment and installations classed, or if conditions are to be expected under which it will be difficult to maintain Class (e.g. war or war-like situations), **BCS** will have to be informed accordingly. **BCS** will decide whether the Certificate will have to be returned and Class suspended or withdrawn. Where only special equipment and installations are concerned, the corresponding Notation will be withdrawn and the Certificate amended accordingly.

**4.2** Class may also be suspended if a naval ship is withdrawn from active service for a longer period.

**4.3** Class will be withdrawn by **BCS** if the Surveyor is not given the possibility to carry out the prescribed regular surveys, or if a survey by **BCS** reveals that the ship no longer complies with the conditions described under 2.1 and 2.2, and the necessary repairs are not carried out.

**5. Re-admission to Class**

having been introduced meanwhile shall be taken into account.

**5.1** Where, after suspension or withdrawal of Class, the repairs required by **BCS** have been carried out and the ship has been subjected to a survey for Readmission to Class, the original Class may be reassigned starting with a new period of Class. Such surveys are generally to be carried out in accordance with the requirements for a Class Renewal Survey, see Section 3.

**5.2** Depending on the duration of the interruption period, parts of the machinery installation may have to be dismantled and sea trials or function tests have to be carried out in excess of the requirements mentioned above. For parts and installations replaced or added in the meantime, the scope of examinations and tests to be carried out for Admission to Class shall be as for new buildings.

**E. Classification Procedures****1. Classification of new buildings****1.1 Order for Classification**

**1.1.1** The written order for Classification is to be submitted to **BCS** in triplicate by the Shipyard or by the Naval Authority, using the form provided by **BCS**. It should be clearly agreed between the parties concerned, e.g. in the building contract, which party will be responsible for compliance with the **BCS** Rules and Guidelines and other rules and regulations to be applied.

**1.1.2** Where orders for the production of components are placed with subcontractors, **BCS** will have to be advised accordingly indicating the scope of the subcontract. The Shipyard is responsible for observance of the rules, guidelines and regulations by subcontractors.

**1.1.3** When particulars already approved by **BCS** for previous ships built under **BCS** supervision are incorporated in the design of the newbuilding, this should be specifically stated in the order for Classification. Amendments to the Construction Rules

**1.2 Examination of design and construction particulars**

**1.2.1** Particulars/documents for examination such as construction plans, calculations, details on materials, type designation of standard equipment, etc. are to be submitted in triplicate in English language to **BCS** in due time prior to commencement of construction/manufacturing, see also Section 4, E.

The particulars submitted shall contain all details required to verify compliance with the Construction Rules. **BCS** reserve the right to request additional information and particulars to be submitted.

**1.2.2** After examination by **BCS**, the documents subject to approval will be returned in one copy with a mark of approval. One copy of each document will be forwarded for verification to the **BCS** inspection office(s) in charge of construction supervision.

**1.2.3** Any deviations from the approved documents e.g. due to requirements of the Naval Authority or alterations suggested by the Shipyard and/or Manufacturer, require to be approved by **BCS** prior to being realized.

**1.3 Supervision of construction and trials**

**1.3.1** **BCS** will assess the production facilities and Procedures of the Shipyard, subcontractors and other manufacturers, to determine whether they meet the requirements of the **BCS** Rules and any additional requirements of the Naval Authority as agreed in the building specification. This assessment may be connected with a quality assurance certification.

**1.3.2** Materials, components, appliances and installations subject to inspection are to comply with the relevant rule requirements and are to be presented for inspection by **BCS** Surveyors, unless otherwise provided as a result of special arrangements agreed upon with **BCS**.

It is the obligation of the Shipyard, subcontractors and other manufacturers to inform the **BCS** inspection office in due time about particular surveys to be carried out.

**1.3.3** In order to enable the Surveyor to fulfill his duties, he is to be given free access to the workshops and to the ship. For performance of the tests required, the Shipyard, subcontractors and other manufacturers are to give the Surveyor any assistance necessary by providing the staff and the equipment needed for such tests.

**1.3.4** During the phase of construction of the ship or installation, **BCS** will satisfy themselves by surveys and inspections that:

- Parts for hull, machinery and electrical installations or special equipment subject to approval have been constructed in compliance with the approved drawing/documents;
- All tests and trials stipulated by the Rules for Classification and Construction are performed satisfactorily;
- Workmanship is in compliance with current engineering Standards and/or **BCS** Rule requirements;
- Welded parts are produced by qualified welders having undergone the required regular tests;
- For hull sections or components requiring approval **BCS** Certificates have been presented. The Shipyard, subcontractors or other manufacturers will have to ensure that any parts and materials requiring approval will only be delivered and installed, if the appropriate certificates have been issued;
- Type-tested appliances and equipment are used, in accordance with the Rule requirements, where individual certificates are not required.

### 1.3.5 Tests

As far as practicable, the machinery including electrical installations as well as special equipment and installations classed will be subjected to operational trials at the manufacturer's premises to the scope specified in the Construction Rules. This applies also to engines produced in series.

Where the machinery, electrical installation or special equipment and installations are of novel design or have not yet sufficiently proved their efficiency and reliability under actual service conditions on board, **BCS** may require performance of trials under specified severe conditions.

### 1.3.6 Shipboard trials

Upon completion of the ship, all hull, machinery including electrical installations as well as special equipment and installations classed will be subjected to operational trials in the presence of the **BCS** Surveyor prior to and during the sea trials. This will include, e.g.:

- Tightness, operational and load tests of tanks, anchoring equipment, hatches and hatch covers shell ports, ramps, etc.
- Operational and/or load tests of the machinery, installations and equipment of importance for safety of the crew and the operational safety of the ship.

**1.3.7** During a final survey, checks will be made to ensure that any deficiencies found, for instance during the sea trials, have been eliminated.

### 1.4 Reports, certificates, documentation

**1.4.1** Testing of materials, components, machinery, etc. at subcontractor's works will be certified by the Surveyor and/or the local **BCS** representation, see 1.3.4.

**1.4.2** Upon completion of the ship and the ship board trials, the Surveyors will prepare construction and survey reports, on the basis of which **BCS** Head Office will issue the Class Certificate.

**1.4.3** The Classification data of each ship will be included in the **BCS** data file and treated as strictly confidential. An extract of these ship data will be entered in the Register Book published by **BCS** if the Naval Authority agrees.

**1.4.4** Where **BCS** has been entrusted in addition and beyond the scope of the Rules mentioned under B. with supervision of construction in accordance with the building specification a Certificate of Conformity (CoC) will be issued and a corresponding Notation added to the Class designation, see Section 2, C.1.4.

## 2. Classification of Existing Ships

### 2.1 Admission to Class

**2.1.1** Naval ships not originally built under supervision of **BCS** may be classed subsequently following the procedures described below, see also A.2.2.

The Naval Authority should contact **BCS** for the necessary arrangements. The written order for Admission to Class of existing ships or special equipment including the required documents shall be formally addressed to **BCS** Head Office in triplicate, using the form provided by **BCS**.

**2.1.2** The following documents updated to present status shall be submitted for examination where applicable. Information shall be provided about any additional regulations to be observed.

Hull and machinery:

- Particulars of the type and main dimensions of the ship, building year, building yard, major conversions, if any, freeboard, stability documentation and details of the anchor equipment;
- Particulars of the type, output and main data, building year and manufacturer of the main engine(s) and of the auxiliary machinery essential for operational safety, the electrical installations, the automatic/remote-control system, the safety arrangements, the steering gear and the windlasses;

- General arrangement, capacity plan, hydrostatic and cross curves, loading manual, where required, midship section, longitudinal and transverse sections, transverse bulkheads, decks, shell expansion, engine and boiler foundations, stem and stern frame, rudder and rudder stock, hatch covers;
- Machinery arrangement and layout, thrust, intermediate and screw shafts, propellers, main engines, propulsion gears and clutch systems, starting-air receivers, auxiliary boilers, gas turbines and related systems, cooling water and lubricating oil systems, bilge and ballast systems, fuel oil and starting-air systems, air and sounding pipe systems, electrical arrangements and wiring diagrams;
- Steering gear arrangement and piping system and steering gear manufacturer make and model information;
- Torsional vibration calculations of the main shafting system including its branches for ships less than two years old;
- Drawings for flexible couplings and/or torque limiting shafting devices in the propulsion line or manufacturer, make, model and rating information for ships with ice class Notation B;
- Instrument and alarm list, fire alarm system, list of automatic safety functions, e.g. slowdowns, etc., function testing plan for ships with Notation AUTN.

For ship type-related equipment and installations the documentation is to be determined from case to case, depending on the scope of Classification agreed and on possible conversions planned at the same time.

**BCS** reserve the right to request additional information depending of ship's type and/or according to Naval Authority requirements.

### 2.2 Survey for admission to class

For Admission to Class the ship and the special equipment to be classed will be surveyed in accordance with the provisions for a Class Renewal Survey, see Section 3, B.1.4. If the result of the survey is satisfactory, the Class of **BCS** will be effective from the date of completion of the survey.

### 2.3 Examination of design and construction particulars

**2.3.1** The requirements according to 1.2 are applicable in principle. The report on the survey according to 2.2 will be evaluated together with the examination of the particulars and/or drawings to be approved.

**2.3.2** Where sufficiently detailed documentation required for approval is not available, the necessary information may have to be gathered by an additional survey, possibly including measurements, and/or by additional investigations, computations, etc.

**2.3.3** If the ship as well as the special equipment and installations classed have the valid Class of another recognized Classification Society, and if sufficient proof has been furnished regarding the present Class status, **BCS** may dispense with parts of the examination of drawings and computations and may reduce the scope of the survey. However, at least a survey to the scope of an intermediate survey according to Section 3 is to be carried out.

### 2.4 Reports, certificates, documentation

**2.4.1** Upon completion of the examinations and surveys mentioned above, a **BCS** Class Certificate will be issued and a Class period defined.

**2.4.2** Regarding Surveyor's reports and certificates, the provisions of 1.4 apply also to the Classification of existing ships.

**2.4.3** Once a naval ship and the relevant equipment have been classed with **BCS**, the Rules in force for surveys as well as procedures applicable to ships constructed under supervision of **BCS** will apply.

**E,F**

### F. Documents to be Carried on Board

To allow quick action in case of surveys, special operation and especially in case of damage, the following documentation must be kept on board and shall be made available to the **BCS** Surveyor on request:

- Class Certificate all Survey Statements and reports;
- Stability Handbook and Loading Manual, if required;
- Description of corrosion protection system;
- "As built" drawings and other documentation containing particulars or instructions of significance as far as BCS is concerned, e.g. use of special steel etc;
- List of important testing/monitoring procedures to be followed in connection with validity of Class.

**SECTION 2****CLASS DESIGNATION**

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## SECTION 2

### CLASS DESIGNATION

#### 2. Class Designation

#### A. General, Definitions

##### 1. General

The Class of a naval ship complying with the **BCS** Rules is expressed by the "Character of Classification", assigned for hull and machinery including electrical installations see B.

Details about hull, machinery including electrical installations as well as special equipment and installations included in the Classification procedure are indicated by "Notations" affixed to the Character of Classification, see C.

The following example shows a Class designation for hull and machinery of a naval ship:

	Character of Classification	Notations
Hull	+ 1 N 5	FRIGATE RSD SFP
Machinery	+ M	CM NBC DEG

#### B. Characters of Classification

##### 1. Survey, Construction Supervision

**1.1 +** heading the Class designation indicates that hull, machinery as well as special equipment and

installations included in the Classification have been constructed:

- Under the supervision of and in accordance with the Rules of **BCS** at the Shipyard and/or at subcontractors supplying construction components / hull sections, as applicable.
- With certification by **BCS** of components and materials requiring inspection subject to the **BCS** Rules.

**1.2** [+] This sign will be part of the Character of Classification if the ship has been designed and constructed in accordance with the rules and under supervision of another recognized Classification Society and is subsequently - or at a later date classed with **BCS**, see Section 1, E.2.

In the event of admission to Class (change of Class) from a Society or institution which is not recognized, prior examination of drawings and existing certificates of the hull structure, the machinery and electrical installations is conditional.

## **2. Compliance with Rule Requirements, Class Period**

### **2.1 Hull**

If the ship's hull fully complies with the Rules of **BCS** or another recognized Classification Society or other rules considered to be equivalent, the Character of Classification will be

#### **1Np**

The figure 1 indicates full compliance with the Construction Rule requirements.

**N** indicates a ship for naval service

**p** figure, indicating the duration of the nominal Class period [years]. Normally, **p** = 5

The nominal Class period may be increased to 6 years, if after examination of the internal inspection and maintenance scheme of the Naval Authority, **BCS** is

convinced that compliance with the Rule requirements can be assured for this extended period.

The nominal Class period can be reduced in exceptional cases and for a limited time, if the ship does not fully comply with the Rules but has been allowed to operate under restrictions, e.g. regarding the service range and/or weather conditions.

## **2.2 Machinery**

**M** The machinery and all installations covered by Classification comply with the requirements of the Rules of **BCS** or other rules considered being equivalent.

**[M]** The machinery does not fully comply with the requirements of the Rules of **BCS**, but functional safety and sea worthiness are ensured for the envisaged service.

## **3. Subdivision, Damage Stability**

If requested by the Naval Authority the following designations may be affixed to the Character of Classification.

**FS** For the hull, proof of subdivision and damage stability has been furnished and verified by **BCS**.

This symbol may be supplemented by a Notation indicating the degree of subdivision, kind of stability assessment and regulations applied, see C.2.2.

## **4. Use of Alternative/Additional Standards**

**(NS)** is appended to the Character of Classification in agreement with **BCS** and the Naval Authority when alternative or additional standards which represent

significant changes to **BCS** Rules or additional requirements to the **BCS** Rule Requirements are applied. Alternative or additional standards are normally raised by the designer or builder.

Alternative or additional standards are to be documented or stated in advance of design appraisal and they are to be clearly defined and referenced in the Classification Certificates and any other required registers such as lifting appliances.

The following can be example uses of **(NS)**:

**N (NS), M (NS), SFP (NS), LA (NS).**

This Notation can only be assigned if the requirements of the building specification are not contrary to or of a lower level than **BCS** Rules in force.

*Note*

*If **BCS** is only entrusted with supervising construction, outfitting and trials of the ship regarding conformity with the building specification agreed upon in the contract between the Naval Authority and the Shipyard, a Certificate of Conformity can be issued without **BCS** Classification.*

## C. Notations

### 1. General Indications

1.1 There are different kinds of Notations, describing particular features, capabilities, service restrictions or special equipment and installations included in the Classification, as defined in the following.

1.2 The Notations to be affixed to the Character of Classification are optional and may be elected by the Naval Authority. The chosen scope of Notations has to be defined in the Classification specification as well as in the building specification.

1.3 It will be the Naval Authority's decision to have the Notations, together with the whole Class designation, included in the published Register of **BCS** or not, see Section 1, E. 1.4.3.

### 1.4 Certificate of Conformity (CoC)

This notation will be assigned and the certificate issued if, in addition to the investigations and surveys usually associated with classification of the hull / machinery, **BCS** has been entrusted with supervising construction, outfitting and trials of the ship regarding conformity with the building specification agreed in the contract between the Naval Authority and the Shipyard, see Section 1, E. 1.4.4.

## 1.5 Environmental standards

**EP** (Environmental Passport Notation) additional class notation is assigned to the ships fulfilling the requirements of the **BCS** Chapter 76 - Guidelines for the Environmental Service System. **When all requirements of EP Notation cannot be complied with, following characters of notations can be assigned individually or in combination eg. EP (A), EP (N, S).**

**A** Anti-fouling coatings, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item B.6)

**B** Ballast water management, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item B.5)

**G** Grey water, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item B.4)

**N** Oxides of nitrogen in exhaust emissions, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item C.1)

**R** Refrigeration systems, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item C.5)

**S** Oxides of sulphur in exhaust emissions, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item C.2)

**O** Oily bilge water, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item B.1 and 2)

**EE** Energy efficiency, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item C.7)

**SR** Ship recycling, (see **BCS** Chapter 76 - Guidelines for the Environmental Service System, Section 2 item D).

## 1.6 Naval Ship Code

The overall aim of the Naval Ship Code as NATO standard ANEP 77 is to provide a frame-work for a naval surface ship safety management system. If the requirements of certain Chapters of the **NSC** are fulfilled, **BCS** may issue the Class Notation for the relevant Chapter(s).

## 1.7 CSR

**CSR** additional class notation is assigned to the ships complying with IACS Common Structural Rules System.

### 2. Hull Notations

#### 2.1 Ship type Notations

**2.1.1** Generally, the type Notation will be assigned according to the indications or suggestions of the Naval Authority.

A Notation indicating the ship type will be added to the Class designation, such as

**CORVETTE**  
**FRIGATE**  
**DESTROYER**  
**MINE WARFARE VESSEL**  
**AMPHIBIOUS WARFARE SHIP**  
**CRUISER**  
**AIRCRAFT CARRIER**

**2.1.2** Where the intended duties of the ship include support functions which may be described by Notations also used for commercial and/or state operated non-military craft, such Notations may be assigned instead of or in addition to the Notations referred to under 2.1, see **BCS** - Classification and Surveys, Section 2, D.

Examples for such Notations are:

**PATROL BOAT**  
**OFFSHORE PATROL VESSEL**  
**SUPPLY VESSEL**  
**RESEARCH VESSEL**  
**CADET TRAINING SHIP**  
**AMPHIBIOUS WARFARE SHIP** (LPD, LHD, LST, LCT, LCM, etc.)  
**ACİL MÜDAHALE VE DALIŞ EĞİTİM BOTU**  
**MOSHIP** Submarine Rescue Mother Ship  
**RATSHIP** Rescue and Towing Ship  
**LCT** Landing Craft Tank  
**LCM** Landing Craft Mechanized  
**LST** Landing Ship Tank  
**LPD** Landing Platform Dock  
**LHD** Landing Helicopter Dock  
**LCVP** Landing Craft, Vehicle and Personnel  
**PRODUCT TANKER**  
**TUG**  
**ESCORT TUG (p,V)**

#### Note

*This is applicable also in the case that the ship is armed, e.g. for defence purposes; regarding*

*inclusion of weapons/military systems in the Classification procedure, see Section 1, A.1.3 and A. 1.4.*

**2.1.3** A Notation may be added if the ship corresponds to a special type regarding the hull configuration and/or kind of propulsion, e.g.:

**HYDROFOIL**  
**CATAMARAN**  
**WATER JET**  
**AIR CUSHION**

#### **2.1.4 High speed craft - Navy**

##### **2.1.4.1 HSC-N**

Special ship types such as catamarans, SWATH, hydrofoil craft, surface effect ships and air cushion vehicles are designed in accordance with the **BCS** Rules, Chapter 7 - High Speed Crafts.

##### **2.1.4.2 HSDE**

Notation for craft which have been constructed by using elements of **BCS** Rules, Chapter 7 - High Speed Crafts and which are not subject to the IMO HSC Code. Details regarding rule application are specified in the Class Certificate.

#### **2.1.5 Auxiliary ship - navy hull**

**AUX-NH** The hull of the ship is partly built according to the **BCS** Rules, Chapter 102 - Hull Structures and Ship Equipment as agreed upon with the Naval Authority case by case.

#### **2.1.6 Novel designs**

**EXP** The ship's hull or essential parts have been constructed in accordance with a design, for which sufficient experience is not available. **BCS** will decide at what intervals the required periodical surveys will have to be carried out. Where experience over a prolonged period of time has proved the efficiency of the design, the Notation **EXP** may be cancelled.

## **2.2 Subdivision, damage stability**

**2.2.1** The proof of damage stability is specified by a Notation consisting of a 5-digit marking. The first two digits represent the ship type, i.e.

**Z1** Naval Surface Ship

The letter following in the third place indicates that the deterministic (D) damage stability assessment method has been applied.

The fourth and the fifth digits, i.e. one digit each, specify the procedure applied, i.e. the subdivision status assumed in the damage stability calculation, see Table 2.1.

**2.2.2** Procedures as developed by IMO such as SOLAS 74/78, LLC 66/68, and MARPOL 73/78, as amended, for commercial ships may be adopted, as far as practicable, if no other adequate regulations are available.

**2.2.3** Damage assumptions shall normally be specified by the Naval Authority in the building specification.

**Table 2.1 Subdivision status**

<b>...D33</b>	3-Compartment-Status, throughout the entire ship's length
<b>...D22</b>	2-Comp.-Status, throughout the entire ship's length
<b>...D21</b>	2-Comp.-Status, partial 1-Comp.-Status for specified compartments, e.g. engine room
<b>...D20</b>	2-Comp.-Status, without damage to specified compartments, e.g. engine room
<b>...D11</b>	1-Comp.-Status, throughout the entire ship's length
<b>...D10</b>	1-Comp.-Status, without damage to specified compartments, e.g. engine room

## **2.3 Ambient conditions and service range**

### **2.3.1 Ambient conditions**

Where more severe ambient conditions are expected by the Naval Authority, one of the two following Notations may be affixed to the Character of Classification.

**AC1** The parameters for ship inclination, for ship movement and the limit conditions as defined in Chapter 102 - Hull Structures and Ship Equipment, Section 1, A.4. Tables 1.1 and 1.2, fourth column, are the basis for the ship design.

**ACS** The special requirements for unusual types and/or tasks of naval ships are agreed upon case by case.

### 2.3.2 Service range

Naval ships complying only with the rule requirements for a restricted range of service will have a corresponding Notation affixed to the Character of Classification. The Notation will indicate the relevant kind of restriction, e.g.:

- Geographical designation of the range of operations
- Distance from defined ports or coast line
- Restrictions related to weather conditions such as wave height etc., possibly combined with speed limitations

The applicable restricted ranges of service will be agreed between the Naval Authority and **BCS**.

#### 2.3.2.1 Restricted International Service – Y

This range of service is limited, in general, to operate along the coast, provided that the distance to the nearest port of refuge and the offshore distance do not exceed 200 nautical miles. This applies also to operation in the North Sea and within enclosed seas, such as the Mediterranean Sea, the Black Sea, the Caspian Sea and waters with similar seaway conditions.

#### 2.3.2.2 Coastal Service - K50/K20

This range of service is limited, in general, to operate along the coasts, provided that the distance to the nearest port of refuge and the offshore distance do not exceed 50/20 nautical miles. This applies also to operation within enclosed seas, such as the Baltic Sea, Marmara Sea and gulfs with similar seaway conditions.

#### 2.3.2.3 Coastal Service – K6

This range of service is limited to operate along the coasts, provided that the distance to the nearest port of refuge and the offshore distance do not exceed 6 nautical miles. This area of service is restricted to operate in shoals, bays, haffs and firths or similar waters, where heavy seas do not occur.

### 2.4 Special considerations for hull structures

#### 2.4.1 Material

If ships are constructed of normal strength hull structural steel, this will not be specially indicated. If other materials are employed for the hull, this will be indicated in the Class Certificate, e.g.

#### HIGHER STRENGTH HULL STRUCTURAL STEEL ALUMINIUM FRP

Material selection, design, dimensioning and manufacturing of hull structures made of fiber reinforced plastics (FRP) are to be agreed upon case by case with **BCS** Head Office.

#### 2.4.2 Rational ship design

Complex hull structures subjected to a variety of static and dynamic loads often require an increased scope of strength investigations, particularly if a weight optimization is necessary. For such cases, **BCS** offers special analysis procedures, which may be indicated in the Class designation by a special Notation, see also, Chapter 102 - Hull Structures and Ship Equipment, Section 4.

Rational Ship Design Notation for ships which are subject to special analysis procedures. The analysis procedures required for the ship's hull comprise inter alia the following:

- First principle design procedures by means of e. g. finite element analysis techniques
- Additional fatigue strength calculations
- Calculation of usage factors and assessment of highly stressed structures

- Determination of explicit corrosion margins of structural members

The analysis results will be stored in a data base.

**RSD (F25)** Fatigue assessment based on  $6.25 \cdot 10^7$  load cycles of North Atlantic Spectrum carried out by **BCS**.

**RSD (F30)** Fatigue assessment based on  $7.5 \cdot 10^7$  load cycles of North Atlantic Spectrum carried out by **BCS**.

**RSD (ACM)** Additional corrosion margin according to detailed listings in the technical file. Analysis carried out by **BCS**.

#### 2.4.3 Residual strength

**RSM** The construction of the hull fulfils the requirements for residual strength following a defined extend of structural damage due to military effects, see Chapter 102 - Hull Structures and Ship Equipment, Section 21.

This includes compliance with the criteria for the damage stability under the respective structural damage assumptions.

#### 2.4.4 In-water surveys

**IWS** The ship's hull is specially equipped for in water surveys, i.e. surveys of the underwater parts carried out in floating condition instead of dry docking. For corrosion protection, see also Section 3, C. and Chapter 102 - Hull

Structures and Ship Equipment, Section 3.

#### 2.4.5 Bridge design

Where ships are to be operated by one person only, or a very limited number of personnel, the workplaces on the bridge shall be arranged according to ergonomic principles.

Ships, which date of contract for construction before 1<sup>st</sup> February 2013 and designed in compliance with the

rules for Chapter 21 – Navigation Bridge Arrangement and Equipment on Seagoing Ships, One-Man Control Console are to be given notation:

**NAV-O** The bridge is designed for ocean area.

**NAV-OC** The bridge is designed for ocean area and coastal waters.

Ships which date of contract for construction on or after 1<sup>st</sup> February 2013, and designed in compliance with the rules for and Chapter 21 - Navigation Bridge Visibility, Bridge Arrangement and Equipment Rules are to be given notation:

**NAV** Designed in compliance with Chapter 21 and equipped with Chapter 21, Section 4, B.1.

**NAV-INS** Integrated Navigation Systems, Designed in compliance with Chapter 21 and equipped with Chapter 21, Section 4, B.2, and C.

If Notation **AC1** or **ACS** is assigned, the respective ambient conditions have to be considered.

#### 2.4.6 Structural fire protection

**SFP** Additional requirements concerning fire resisting divisions, combustible materials, ventilation, etc. have been fulfilled, see Chapter 102 - Hull Structures and Ship Equipment, Section 20.

#### 2.4.7 Navigation in ice

**B** The hull is designed such as to comply with the requirements for navigation in drift ice in mouths of rivers and in coastal regions, see Chapter 102 - Hull Structures and Ship Equipment, Section 13.

#### 2.4.8 Emergency Response Service

**ERS** The geometry and structural data of the ship are made available in a database to provide the assistance necessary for limiting damages and/or taking the adequate measures in case of average, with the aid of special computer programs.

#### 2.4.9 Loading Instrument

LI Loading Instrument - This notation will be assigned where an approved loading instrument has been installed either as a

Class or Owner's requirement.

As a supplement to the approved documentation for intact and damage stability and longitudinal strength (both for intact and damage condition) and torsional moments and lateral loads, where applicable; a loading instrument, approved by **BCS**, is to be provided to facilitate calculations for the intact and damage stability and longitudinal strength (both for

intact and damage condition) and torsional moments and lateral loads, where applicable.

General Provisions are settled in Part A

Chapter 1 Hull Section 6 H. Loading Guidance Information and Section 26 F. Onboard Stability Instruments.

### 3. Machinery Notations

#### 3.1 Automation

**3.1.1** Depending on the requirements in the building specification, the following Notations may be assigned if the conditions defined in, Chapter 106 - Automation, Section 2 are fulfilled.

**AUT-N** The machinery installation is fitted with equipment needed to ensure safe operation of the engines and systems without any intervention for operation and/or maintenance by the crew over a period of at least 24 hours.

**AUT-Nnh** The machinery installation is fitted with equipment needed to ensure safe operation of the engines and systems without any intervention for operation and/or maintenance by the crew over a period of at least *n* hours.

**AUT-C(NS)** Automation-Centralized Control Station- This notation may be assigned when the automated equipment can be controlled and monitored from a central control station as referenced in **BCS** Chapter 106, Section 2, A.3.

**3.1.2** For ships equipped with arrangements such that the control and supervision of the ship operational functions are computer based, ICC Notation is assigned. For this purpose Chapter 105 - Naval Ship Technology - Electrical Installations - Section 10, ISO IEC 60182 FMEA and applicable provisions of Chapter

106 - Naval Ship Technology - Automation - Annex shall be complied with.

#### 3.2 Redundant propulsion and steering systems

Naval ships with propulsion and steering systems which meet the redundancy requirements of **BCS** obtain one of the following Notations affixed to the Character of Classification, see also, Chapter 104 - Propulsion Plants, Section 2, K.:

**RP1 x%** The ship has at least two propulsion machines, which are independent or can be disconnected from each other. This also applies to the auxiliary systems which are needed to operate the propulsion machines. No redundancy of propeller, shaft line, gearbox and steering system is required.

**RP2 x%** The ship has at least two propulsion systems and two steering systems, each of which is independent or can be disconnected from each other. This also applies to each of the auxiliary systems which is needed to operate the propulsion and/or steering systems.

**RP3 x%** The ship has at least two propulsion systems and two steering systems, each of which is independent or can be disconnected from each other and is installed in separate compartments. This also applies to each of the auxiliary systems which is needed to operate the propulsion and/or steering systems.

The additional index *x%* denotes what percentage of the main propulsion power is provided by the redundant ship's propulsion systems.

#### 3.3 Dynamic positioning systems

Notation for ships designed to maintain a desired position within the normal excursions of the control system under defined environmental conditions, see,

Chapter 104 - Propulsion Plants, Section 7, K. Depending on the desired system reliability and on the basis of a risk analysis one of the following three Notations may be assigned:

**DK1** Non-redundant, i.e. loss of position may occur in the event of a single fault.

**DK2** Redundant, i.e. loss of position may not occur in the event of a single fault, static components are not considered.

**DK3** Redundant, separate compartments, i.e. loss of position may not occur, if in addition to **DK2** any normally static component is assumed to fail and all components in any one watertight compartment or in any one fire subdivision are assumed to fail by flooding or fire.

### 3.4 Navigation in ice

**B** The machinery is designed such as to comply with the requirements for navigation in drift ice in mouths of rivers and in coastal regions. See, Chapter 104 - Propulsion Plants, Section 9.

### 3.5 Condition monitoring

The machinery installations are provided with a condition monitoring system to reliably determine the condition of their components, see also Section 3, B.1.5.6.4

Depending on the minimum achieved scope of condition monitoring one of the following Notations may be assigned:

**CM1** Up to 3 % of the possible condition monitoring scope is achieved.

**CM2** Up to 10 % of the possible condition monitoring scope is achieved.

**CM3** Up to 20 % of the possible condition monitoring scope is achieved.

**CM4** More than 20 % of the possible condition monitoring scope is achieved.

### 3.6 Auxiliary ship - navy machinery

**AUX-NM** The machinery installations of the ship are partly built according to the BCS Construction Rules Chapter 104 – Naval Ship Technology, Propulsion Plants, Chapter 105 – Naval Ship Technology, Electrical Installations as agreed upon with the Naval Authority case by case.

### 3.7 Novel designs

**EXP** The machinery installations or essential parts have been constructed in accordance with a design, for which sufficient experience is not available. **BCS** will decide at what intervals the required periodical surveys will have to be carried out. Where experience over a prolonged period of time has proved the efficiency of the design, the Notation **EXP** may be cancelled.

## 4. Other Special Equipment and Installations

### 4.1 Hull Notations

#### 4.1.1 Hull Notations for Flight Operations

An example is given in the following:

**FO** The ship is equipped for flight operations. The main elements for aircraft handling are included in the Classification procedure, see Chapter 102 - Hull Structures and Ship Equipment, Section 23 and Chapter 107 - Ship Operation Installations and Auxiliary Systems, Section 13, A.

#### 4.1.2 Protective Coating

**PCWBT** Protective Coating in Water Ballast Tanks This notation will be assigned to indicate that the ship's seawater ballast tanks are provided with a corrosion protection system using by

coatings according to **BCS** Chapter 1, Section 22, A.7.1.

## 4.2 Machinery Notations

Additional machinery Notations may be affixed to the Character of Classification for machinery respectively. Examples are given in the following:

### 4.2.1 Lifting appliances

**LA** The ship is equipped with lifting appliances, other than those needed in connection with the equipment described under 4.2.2., such as cranes or lifts which have been included in the Classification procedure, see Chapter 107 - Ship Operation Installations and Auxiliary Systems, Section 3, A.

The class notation **LA** will, in general, be assigned for a classed ship as a mandatory class notation where the lifting appliance is considered to be an essential feature.

**LA (CL)** Cargo Lift – This notation is assigned in compliance with Chapter 107 - Naval Ship Technology, Ship Operation Installations and Auxiliary Systems- Section 3 E.2.2 to ships having lifts to be used for transporting military supplies

**LA (CR)** Cargo Ramp - This notation is assigned in compliance with Chapter 107- Naval Ship Technology, Ship Operation Installations and Auxiliary Systems- Section 3 G to ships having movable ship borne vehicle ramps moved and/or used for loading/unloading in calm water.

**LA (PL)** Passenger Lift - This notation is assigned in compliance with Chapter 107- Naval Ship Technology, Ship Operation Installations and Auxiliary Systems- Section 3 E.2.1 to ships having passenger lifts that are designated to transport crew members or embarked troops.

### 4.2.2 Replenishment at sea

**RAS** The ship is equipped with installations for the transfer of liquids, such as fuel, oil, water, stores and persons while operating at sea.

This Notation may be assigned to the supplying ship as well as to the receiving ship, see Chapter 107 - Ship Operation Installations and Auxiliary Systems, Section 4, A.

### 4.2.3 Protection against nuclear, biological and chemical warfare

**NBC** The ship is designed and equipped to meet the requirements for protection within a citadel, against the fall-out of nuclear, as well as biological and chemical weapons, see Chapter 107 - Ship Operation Installations and Auxiliary Systems, Section 11, A.1 and B.

### 4.2.4 Diving systems

**DI** The ship is equipped with diving installations according to the Classification requirements, see Chapter 107 - Ship Operation Installations and Auxiliary Systems, Section 18, A.

### 4.2.5 Degaussing

**DEG** The ship is equipped with an active system for degaussing (magnetic self-protection) by means of cable windings in the ship which reduce the magnetic signature, see Chapter 105 - Electrical Installations, Section 12, F.

### 4.2.6 Fuel cell systems

**FC-xxx** Notation for ships and boats with fuel cell systems the nominal power of which is equal or exceeds 10% of the total nominal

power of the machinery installation (excluding the emergency supply power) and complying with the **BCS's** "Guidelines for the Use of Fuel Cell Systems on Board of Ships and Boats".

"xxx" means the percentage of the fuel cell system related to the nominal power of the machinery installation.

18.3.

**with FC** Notation for fuel cell systems the nominal power of which is below 10 % of the nominal power of the machinery installation.

#### 4.2.7 Submersible

**U** Additional class notation is assigned to the submersible fulfilling the requirements of the **BCS** Rules Chapter 4- Machinery and Chapter 5 - Electrical Installation.

#### 4.2.8 Submarine

**SUBMARINE** Additional notation for submarines complying with related Bahria Classification Society rules.

#### 4.2.9 Air independent power

**AIP-xxx** Notation for submarines with AIP (Air Independent Power) systems having a rated output equal or greater than 10 % of the rated output of the machinery installation.

**with AIP** Notation for submarines with AIP (Air Independent Power) systems having a rated output lower than 10 % of the rated output of the machinery installation.

#### 4.2.10 Towing Arrangements

**TA1 (TA2, TA3)** Towing Arrangements - This notation will be assigned when an appraisal has been made of the towing arrangements and strength performance of the supporting structures in accordance with Chapter 102, Section 18, G.2.3.6 ÷ G.2.3.14.10. This notation recognises the least severe weather conditions, see Chapter 102, Section 18, Table

2-

#### 4.2.11 Manoeuvring Capability Assessment

**MCA** Manoeuvring Capability Assessment - For the assignment of the MCA notation, the ship is to be assessed in accordance with the requirements of IMO Res.MSC 137(76). IMO Res.A 601(15) and MSC Circ.1053 are also to be taken into consideration. In cases where a large displacement ship does not satisfy the stopping standard referred above, ship's stopping capability will be specially considered.

Model test reports may be accepted instead of calculations provided that they reflect all required conditions.

#### 4.2.12 Fire Fighting

Following notations are assigned to ships which are complying with Part C, Chapter 11.

**FF0** For ships when the characteristics of the firefighting system are not those required for the assignment of the additional service features **FF1, FF2** or **FF3**, and when the system is specially considered by **BCS**.

**FF1** For ships provided with equipment for fighting fires in the initial stage and performing rescue operations in the immediate vicinity of the installation on fire.

**FF2** For ships provided with equipment for sustained fighting of large fires and for cooling parts of the installation on fire.

**FF3** For ships provided with equipment corresponding to **FF2**, but with greater fireextinguishing capacity and more comprehensive fire-extinguishing equipment.

**FF1/2** For ships provided with equipment corresponding to **FF2** and additionally suited for rescue operations as per **FF1**.

**FF1/3** For ships provided with equipment corresponding to **FF3** and additionally suited for rescue operations as per **FF1**.

#### **4.3 Notations for Electrical Installations**

**ELS** Quality of Electrical Power Supplies - This notation will be assigned to indicate that the mains quality of the electrical power supply are complied with the requirements of NATO Standardization Agreement (STANAG) 1008 as referenced in **BCS** Chapter 105, Section 1, F.2.1. It also shows that the installation has been arranged, installed and tested in accordance with **BCS** Rules.

#### **5. Notations for Naval Ships**

Table 2.2 gives an overview for the various Notations which may be assigned to naval ships. Additional information is given in the respective Chapters.

2-

Table 2.2 Summary of notations for naval ships

Chapter 101	Chapter 102	Chapter 104	Chapter 105/106	Chapter 107
Classification and Surveys	Hull Structures and Ship Equipment	Propulsion Plants	Electrical Installations / Automation	Ship Operation, Installations and Auxiliary Systems
Ship type: <b>CORVETTE</b> <b>FRIGATE</b> <b>DESTROYER</b> <b>CRUISER</b> <b>MINE WARFARE VESSEL</b> <b>AMPHIBIOUS WARFARE SHIP</b> <b>AIRCRAFT CARRIER</b> <b>PATROL BOAT</b> <b>OFFSHORE PATROL VESSEL</b> <b>SUPPLY VESSEL</b> <b>RESEARCH VESSEL</b> <b>CADET TRAINING SHIP</b> <b>AMPHIBIOUS WARFARE SHIP</b> (LPD, LHD, LST, LCT, LCM, etc.) EMERGENCY RESPONSE DIVE TRAINING BOAT <b>MOSHIP</b> Submarine Rescue Mother Ship <b>RATSHIP</b> Rescue and Towing Ship <b>LCT</b> Landing Craft Tank <b>LCM</b> Landing Craft Mechanized <b>LST</b> Landing Ship Tank <b>LPD</b> Landing Platform Dock <b>LCVP</b> Landing Craft, Vehicle and Personnel <b>PRODUCT TANKER</b> <b>TUG (4)</b> <b>ESCORT TUG (p,V) (5)</b> <b>SUBMARINE</b> <b>LHD</b> Landing Helicopter Dock  Special types, e.g.: <b>HYDROFOIL</b> <b>CATAMARAN</b> <b>WATER JET</b> <b>AIR CUSHION</b>  High speed craft: <b>HSC-N</b> <b>HSDE</b>  Auxiliary ship-Navy: <b>AUX-NH</b> <b>AUX-NM</b> Certificate of Conformity: <b>CoC</b> <b>IACS</b> Common Structural Rules: <b>CSR</b> Naval Ship Code: <b>NSC</b>	Ambient conditions: <b>AC1</b> <b>ACS</b>  Material: <b>(HIGHER STRENGTH HULL STRUCTURAL STEEL)</b> <b>ALUMINIUM</b> <b>FRP</b>  Residual strength after military effects: <b>RSM</b>  Rational ship design: <b>RSD (F25)</b> <b>RSD (F30)</b> <b>RSD (ACM)</b>  In-water survey: <b>IWS</b>  Structural fire protection: <b>SFP</b>  Navigation in ice: <b>B</b>  Bridge design: <b>NAV-O</b> <b>NAV-OC</b>  Novel design: <b>EXP</b>  Emergency response service: <b>ERS</b>  Service range: <b>Y</b> <b>K50/K20</b> <b>K6</b>  Towing arrangement: <b>TA1 (TA2, TA3)</b>  Corrosion Protection (1): <b>PCWBT</b>  Loading Instrument (2): <b>LI</b>	Condition monitoring: <b>CM1</b> <b>CM2</b> <b>CM3</b> <b>CM4</b>  Redundant propulsion: <b>RP1 x %</b> <b>RP2 x %</b> <b>RP3 x %</b>  Dynamic positioning: <b>DK1</b> <b>DK2</b> <b>DK3</b>  Fuel Cell Systems: <b>FC-xxx with FC</b>  Navigation in ice: <b>B</b>  Novel design: <b>EXP</b>  Air Independent Power: <b>AIP-xxx with AIP</b>  Manoeuvring Capability Assessment (3): <b>MCA</b>	Automation: <b>AUT-N</b> <b>AUT-Nnh</b> <b>AUT-C(NS)</b>  Degaussing: <b>DEG</b>  Quality of Electrical Power Supplies: <b>ELS</b>  Integrated Computer Control: <b>ICC</b>	Lifting appliances: <b>LA</b> <b>LA (CL)</b> <b>LA (CR)</b> <b>LA (PL)</b>  Replenishment at sea: <b>RAS</b>  Flight operation: <b>FO</b>  NBC protection: <b>NBC</b>  Diving systems: <b>DI</b>  Environmental Passport: <b>EP (6)</b>  Fire Fighting (7) : <b>FF0</b> <b>FF1</b> <b>FF2</b> <b>FF3</b> <b>FF1/2</b> <b>FF1/3</b>

Submersible:

U

- (1) For **PCWBT** Notation, see **BCS** Rules Chapter 1 Hull Section 22 A.7.1.
- (2) For **LI** Notation, see **BCS** Rules Chapter 1 Hull Section 6 H. and Section 26 F.
- (3) For **MCA** Notation, see **IMO** Res.MSC 137(76), **IMO** Res.A601(15) and **MSC** Circ.1053.
- (4) For **TUG** Notation, see **BCS** Rules Chapter 1 Hull Section 29.
- (5) For **ESCORT TUG (p,V)** Notation, see **BCS** Rules Chapter 1 Hull Section 29 and Chapter 13 Escort Tugs.
- (6) For **EP** Notation, see **BCS** Rules Chapter 76 Environmental Protection System.
- (7) For **FF0, FF1, FF2, FF3, FF1/2, FF1/3** Notations, see **BCS** Rules Chapter 11 Fire Fighting Ships.

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## SECTION 3

### SURVEYS

#### A. General Indications

##### 1. Surveys for Maintenance of Class

**1.1** For maintenance of Class, the regular periodical and non-periodical surveys of hull and machinery, including electrical installations as well as special equipment and installations agreed to be in the scope of Classification have to be performed as detailed in the following, see also Section 1, D.2.2.

For other surveys performed by **BCS** see 4.

**1.2** Surveys required for maintenance of Class, e.g. in the case of repairs of, or modifications to any parts subject to Classification, are to be agreed with **BCS** Head Office or the local **BCS** representations in due time, so that the measures envisaged may be assessed and supervised as required.

**1.3** The Surveyors are to be given access at any time to the ship and/or to the workshops, so that they may perform their duties. See also Section 1, E.1.3.3. In this connection all areas to be surveyed have to be cleared, cleaned and are to be made gas-free, as deemed necessary by the Surveyor.

The Class Certificate and other documents related to Classification and carried on board are to be made available to the Surveyor on request.

**1.4** In special cases, e.g. where damages require immediate inspection and decisions, a survey may be conducted while the ship is not in harbour. The prerequisites, procedure and specific conditions to be met, e.g. weather, will be fixed case by case. The decision as to feasibility of the survey may only be taken in agreement with the Surveyor.

**1.5 BCS** will inform the Naval Authority about the status of Class, indicating the last recognized surveys and the next due dates. However in principle it remains the responsibility of the Naval Authority to comply with the Class conditions and to observe the dates for the prescribed surveys, see Section 1, D.2.8.

**1.6** Upon request **BCS** may agree to testing, monitoring and analysis procedures as a supplement to or equivalent substitute for conventional survey methods, see B.1.5.6.

**1.7 BCS** reserve the right to extend the scope of a survey and/or inspection for given reasons, e.g. in case of suspected damage or other negative experience gained, possibly on board of similar ships or ships with similar components.

Likewise, **BCS** reserve the right to demand surveys to be held between the due dates of regular periodical surveys.

##### 2. Selection of Surveyors

On principle, the acting Surveyors will be chosen by **BCS**. However, the Naval Authority is free to have any findings of surveys and decisions resulting there from, which deem to be doubtful, checked by other **BCS** Surveyors upon special request to Head Office.

##### 3. Documentation of Surveys, Confirmation of Class

**3.1** The records of each survey, as well as any requirements upon which maintenance of Class has been made conditional, will be entered into the respective Survey Statement.

By his signature in the Certificate and other documents the Surveyor only certifies what he himself has seen and checked during the particular survey.

**A,B**

**3.2** The reports prepared by the Surveyor will be sent to **BCS** Head Office. If there are no objections, the results will be documented in the **BCS** Register, see Section 1, E.1.4.3, and the confirmation of Class effected by the Surveyor in the Certificate will acquire final validity.

**3.3** In Part 2 of the Register the dates of the surveys will be indicated, such as renewal, intermediate and annual Class surveys, boiler surveys, surveys in connection with continuous Class renewal, bottom and propeller shaft surveys.

**3.4** On request, the Class may be confirmed in writing by a separate Certificate issued by Head Office.

**3.5** Where defects are repaired provisionally only, or where the Surveyor does not consider immediate repair or replacement necessary, the ship's Class may be confirmed for a limited period. Cancellation of such limitations will also have to be indicated in the Survey Statement.

#### **4. Surveys Required by the Naval Authority**

**4.1** Where surveys are requested by the Naval Authority on account of international conventions and/or of corresponding laws and regulations of a Flag State, **BCS** will carry them out by order or within the framework of the contract between **BCS** and the Naval Authority based on the respective provisions. This includes surveys according to SOLAS 74, LLC66/68 or MARPOL 73/78.

Where possible, such surveys will be carried out simultaneously with the Class surveys.

**4.2** If for some reason a ship's Class has expired or has been withdrawn by **BCS**, all certificates according 4.1 issued by **BCS** will automatically become void. If subsequently the Class is renewed or reassigned, the validity of these certificates may be revived within the scope of their original period of validity, provided that all surveys meanwhile having fallen due have been carried out to the satisfaction of the Surveyor.

**4.3** All activities outlined in 4.1 and 4.2 and, where applicable, issuance of relevant certificates are likewise subject to the respective latest edition of Section 1 - General Terms and Conditions.

#### **5. External Service Suppliers**

Personnel or firms engaged in services affecting Classification and statutory work are subject to approval by **BCS**.

#### **B. Surveys for Maintenance of Class, Definitions, Due Dates**

##### **1. Periodical Surveys**

###### **1.1 General**

**1.1.1** The periodical surveys listed in the following are to be conducted for the hull, machinery including electrical installations as well as special equipment and installations included in the Classification of the ship.

If for some obvious reason, e.g. a temporary out of service condition of certain equipment, parts included in the Classification cannot be surveyed, this will be noted in the Survey Statement.

For scope and details of the surveys, see C.

**1.1.2** Where Flag State regulations are applicable which impose inspection intervals deviating from the Class related intervals, the intervals will be harmonized in the individual case to reduce the number of single surveys, where possible.

###### **1.2 Annual surveys**

**1.2.1** Annual surveys are to be conducted at nominal intervals of 12 months, as from the date of commencement of the Class period **p** indicated in the Class Certificate.

**1.2.2** The survey has to be carried out within a time interval of 3 months before to 3 months after the day at which one year of the current Class period expires.

### 1.3 Intermediate surveys

Extended annual surveys are referred to as intermediate surveys, see C.2.

The intermediate survey falls due at half the nominal time interval between two Class Renewal Surveys (i.e.  $p/2$ ). If  $p$  is an uneven number of years, the survey may be carried out on the occasion of the preceding or following annual survey. If  $p$  is an even number of years, the intermediate survey replaces the annual survey.

#### 1.4 Class Renewal Surveys

**1.4.1** Class Renewal Surveys -also called special surveys - are to be carried out at the intervals  $p$  indicated by the Character of Classification.

In exceptional cases extension of the Class period by 3 month at the most may be granted by **BCS** upon request.

**1.4.2** Class renewals for hull are numbered in the sequence I, II, III, etc. Regarding their scope, see C.3.

**1.4.3** A Class Renewal Survey may be carried out in several parts. The survey may be commenced at the last annual survey during the Class period and must have been completed by the end of the Class period.

Considering 1.2.2, the total survey period of the Class Renewal Survey must not exceed 15 months.

Regarding dry docking, see 1.8.

**1.4.4** The new period of Class will commence:

- With the following day, after which the previous Class expires, provided that the Class Renewal Survey has been completed within the 3 months preceding that date. This applies also to a granted extension of the Class period by 3 months at the most;
- With the date on which the Class Renewal Survey has been completed, if this is the case more than 3 months before expiry of the previous Class.

### 1.5 Continuous Class Renewal Surveys

**1.5.1** On request of the Naval Authority, the surveys required for Class renewal may be split, according to a schedule to be agreed, such as to extend over the entire period of Class so that a corresponding percentage of all surveys required for Class renewal will be completed every year.

This means that all areas subject to survey as defined by **BCS** Head Office are to be surveyed at least once per Class period, unless closer intervals are prescribed by the Naval Authority, see 1.1 and Section 1, B.3. The time interval between two subsequent surveys of each individual area or part shall not exceed  $p$  years.

**1.5.2** Regarding the duration of the period of Class and due dates of surveys, the requirements as per 1.4.1 and 1.4.4 remain mandatory.

**1.5.3** Continuous Class Renewal may be separately requested for hull, machinery as well as special equipment and installations.

**1.5.4** Surveys held within the Continuous Class Renewal procedure may be combined with annual and intermediate surveys in a reasonable manner. However, the requirements for annual and intermediate surveys remain mandatory.

**1.5.5** At the end of the Class period, for the purpose of Class renewal, a final survey will be performed, during which the Surveyors will satisfy themselves as to whether all areas required to be surveyed have been surveyed throughout and with satisfactory results. If there are special reasons, a Surveyor may inspect individual parts again.

#### 1.5.6 Planned Maintenance System

**1.5.6.1** On request of the Naval Authority, an optimized Continuous Class Renewal system may be agreed upon as outlined in the following for ships the machinery of which is maintained with the aid of an approved, computer-assisted maintenance system. The Naval Authority will introduce a Planned Maintenance System comprising at least the survey scopes / systems as covered by the normal Continuous Class Renewal system.

**1.5.6.2** For approval by **BCS**, the following documentation shall be submitted:

- Detailed description of the maintenance system, indicating the flow of information and personnel responsibilities,
- List of components/systems to be covered by the maintenance and Class renewal system

(inventory content),

- Indication of intervals for each of the maintenance measures in general,
- List of maintenance intervals (time between overhaul - TBO) and of the expected lifetime (LT) of the main and auxiliary machinery components essential for operation, taking into account manufacturers' recommendations and specific operational requirements,
- list of instructions (Maintenance Procedures) underlying the maintenance concept,
- Description of maintenance documentation (reports containing important operational information, component condition, offset sheets, measures carried out),
- Documentation on the maintenance strategy applied prior to filing of the application.

**1.5.6.3** Within the scope of a shipboard survey the **BCS** Surveyor will confirm that:

- The current maintenance system complies with the approved documentation,
- The current maintenance system takes into account, without reservations, the specific service conditions,
- The maintenance documentation permits conclusions to be drawn as to the construction condition and operability of the machinery,
- The personnel in charge of operation of the machinery is properly qualified and hold the necessary qualification certificates.

#### **1.5.6.4 Trend Diagnosis System**

Machinery or technical installations which are subject to a Trend Diagnosis System are surveyed to the scope and at

the intervals agreed with **BCS** from case to case and may be included in the Continuous Class Renewal lists.

#### **1.5.6.5 Condition Monitoring System**

Machinery or technical installations, which are subject to a Condition Monitoring System, are surveyed in line with the requirements and prerequisites described in the BCS Rules, Chapter 25 - Guidelines for Machinery Condition Monitoring. Prerequisite for the acceptance of a Condition Monitoring System is the existence of a Planned Maintenance System (PMS), approved by **BCS**.

The Condition Monitoring System is not limited to the equipment used to determine the machinery's condition, but includes also the applied procedures and schedules for data collection and analysis.

Information derived from Condition Monitoring of technical installations, machinery, or parts of machinery, can be accepted by **BCS** as equivalent to direct inspection, if the information results provided are reliable and trustworthy for assessing the actual condition as it would be derived from direct inspection.

In this case the conventional survey can be omitted, if Condition Monitoring shows that previously defined acceptance criteria are satisfactorily met. Any item of the installation or machinery not covered by Condition Monitoring shall be surveyed and credited in the conventional way.

If a Planned Maintenance System has been introduced and approved by **BCS**, which includes a Condition Monitoring System, one of the Notations CM1 to CM4 may be assigned, see Section 2, C.3.5.

#### **1.6 Periodical surveys of propeller shafts and tube shafts, propellers and other systems**

For maintenance of the Class, periodical surveys and tests of propeller shafts and tube shafts, propellers and other systems of naval ships are to be carried out.

The scope of surveys and tests unless specifically restricted is defined in C.2.4.

### 1.6.1 Propeller shafts and tube shafts

The following surveys are applicable:

- Normal survey
- Modified survey
- Partial survey

#### 1.6.1.1 Normal survey

**1.6.1.1.1** Where the propeller shafts and tube shafts are fitted with continuous liners or approved oil sealing glands, or are made of corrosion resistant materials, the interval of survey is to be:

- 3 years for single shafting arrangement,
- 4 years for multi-shafting arrangement.

The interval of drawing may be raised to:

- **p** years for single shafting arrangement,
- **p** years for multi-shafting arrangement.

at the most, in any of the following three cases:

- 1. case
- The propeller is fitted to a keyed shaft taper,
- The design details of which are approved,
- The shaft is protected from seawater,
- A non-destructive examination is made at each survey by an approved crack detection method of the after end of the

cylindrical part of the shaft (from the after end of the liner, if any), and of about one third of the length of the taper from the large end, or

- 2. case
- The propeller is fitted to a solid flange coupling at the aft end of the shaft,
- The shaft and its fittings are not exposed to corrosion,
- The design details are approved,
- A non-destructive examination is made at each survey by an approved crack detection method of the after flange fillet area of the shaft, or
- 3. case
- The propeller is fitted keyless to the shaft taper,
- The shaft is protected from seawater,
- The design details are approved,
- A non-destructive examination is made at each survey by an approved crack detection method of the forward part of the aft shaft taper.

In all other cases the nominal interval of survey is to be 2.5 years with an admissible time window of  $\pm 6$  months.

**1.6.1.1.2** Propeller shafts and tube shafts are to be sufficiently drawn to permit entire examination. For further details see C.2.4.1.1.1.

For oil lubricated arrangement, the shaft need not be drawn at the occasion of the normal survey, provided that all exposed areas of the after shaft area as described in 1.6.1.1.1 are examined by an approved

crack-detection method without drawing of the shaft, where

- The clearances and wear down of the bearings,
- The records of lubricating oil analysis, oil consumption and bearing temperature,
- The visible shaft areas.

are examined and found satisfactory. Lubricating oil and bearing temperature controls are to be performed as specified in 1.6.1.2.2. For further details see C.2.4.1.1.2. Where any doubt exists regarding the findings of the above, the shaft is to be sufficiently drawn to permit an entire examination.

#### 1.6.1.2 Modified survey

**1.6.1.2.1** For single and multi-shafting arrangements a modified survey may be accepted instead of the normal survey at alternate **p** yearly survey intervals, at the most, subject to:

- The shaft is fitted with oil lubricated bearings and oil sealing glands,
- The shaft and its fittings are not exposed to corrosion,
- New oil seals may be fitted without removal of the propeller (except in the case of keyed propeller),
- The design details are approved.

and provided that the clearances of the aft bearing are found in order and the lube oil and the oil sealing arrangements have proved effective in any of the following three cases:

- Where the propeller is keyed on the shaft taper and suitable crack-prevention measures are taken, or

- Where the propeller is fitted to a solid flange coupling at the end of the shaft, or

- Where the propeller is fitted keyless to the shaft taper.

The maximum interval between two successive normal surveys is not to exceed **2p** years.

**1.6.1.2.2** The shaft is to be sufficiently drawn to permit examination of the aft bearing contact area of the shaft. For further details see C.2.4.1.2.1.

Drawing of the shaft to expose the aft bearing contact area of the shaft may not be required where a lubricating oil analysis is carried out regularly at intervals not exceeding 6 months, and the oil consumption and bearing temperature are recorded and considered to be within permissible limits. The documentation on lubricating oil analysis is to be available on board and be checked. Each analysis should include the minimum parameters:

- Water content,
- Chloride content,
- Content of bearing metal particles,
- Oil aging (resistance to oxidation).

Oil samples should be taken under service conditions. For further details see C.2.4.1.2.2. Where any doubt exists regarding the findings of the above, the shaft is to be sufficiently drawn to permit an examination according to C.2.4.1.2.1.

#### 1.6.1.3 Partial survey

**1.6.1.3.1** Upon request by the Naval Authority for shafts where the modified survey is applicable and

- A prolonged service fatigue life of seals is expected due to the appropriate combination of materials and controlled pressures in way of seals

consideration may be given to a prolongation of the yearly interval between normal surveys, provided a partial survey is performed.

In no case must the interval between normal surveys exceed 1.5 times the due interval.

**1.6.1.3.2** The partial survey consists of checking the oil sealing glands and the clearance of the bearings. For keyed propellers, the propeller is to be dismantled to expose the forward part of the taper, and a non destructive examination by an approved crack detection method is to be performed. For further details see C.2.4.1.3.

### 1.6.2 Propellers

During normal or modified surveys of the propeller shafts and tube shafts, the propellers as well as the remote and local control gear of controllable pitch propellers are to be surveyed at the Surveyor's discretion, depending on the findings.

### 1.6.3 Other systems

Other systems for main propulsion purposes, such as rudder and steering propellers, pod propulsion systems, pump jet units, etc., are subject to the same survey intervals as propeller shafts and tube shafts.

## 1.7 Automation equipment

**1.7.1** For confirmation of the Class Notation, machinery having been assigned the Notations AUT-N or AUT-Nnh is to be inspected in accordance with **BCS** programmes AUT-N 3 and AUT-N 4, respectively.

### 1.7.2 AUT-N 3

The AUT-N 3 non-recurring survey is to be carried out 6 months after commissioning of the ship and, in the case of retrofitting, major conversions or repairs of the automation equipment, 6 months after completion. The survey serves the purpose of confirming the relevant Notation, following a trial phase.

### 1.7.3 AUT-N 4

The AUT-N 4 survey is to be carried out twice during a Class period, preferably during each Class renewal and intermediate survey, see also Section 2, C.3.1.

## 1.8 Bottom surveys

**1.8.1** Naval ships are generally to be subjected to a bottom survey twice during the Class period **p**.

As a matter of principle, Class renewal includes a bottom survey. The second required bottom survey shall be planned as follows:

For **p** = 5, the bottom survey may be carried out in connection with the second or third regular annual survey within the Class period, but not later than 36 months after the last bottom survey.

For **p** = 6, the bottom survey should be carried out on the occasion of the intermediate survey, but not later than 39 months after the last bottom survey.

**1.8.2** Bottom surveys will generally have to be carried out in dry dock. For in-water surveys see

1.9. Bottom surveys serve the purpose of periodical checking the underwater hull, the openings and closures in the shell relating to machinery systems and externally arranged components of the steering and propulsion systems. For details, see C.2.3.4, C.3.2 and C.3.3.

**1.8.3** If a bottom survey is intended to be credited to a Class renewal, all checking of hull and machinery prescribed for the respective Class renewal and usually requiring dry docking will have to be carried out.

A bottom survey for Class renewal may be carried out up to 15 months before completion of the Class Renewal Survey, see 1.4.3.

**1.8.4** It is also expected that for each bottom survey performed in addition to the bottom surveys stipulated by the Classification requirements a **BCS** Surveyor will be called to attend.

## 1.9 In-water surveys

**1.9.1** For ships assigned the Class Notation IWS, an in-water survey performed with the assistance of approved divers may be recognized as a substitute for every second periodical bottom survey in a dry dock, see C.4.

**1.9.2** On request and in exceptional cases only, in-water surveys with the assistance of approved divers may also be carried out as a substitute for every second bottom survey in a dry dock for ships not carrying the Class Notation IWS. In any such case **BCS** Head Office is to be informed. The relevant permission will be endorsed in the annex to the Class Certificate.

**1.9.3** Special consideration will be given to ships aged 15 years and over, prior to permission being granted to carry out an in-water survey in lieu of a bottom survey in dry dock.

## 2. Non-periodical surveys

### 2.1 Damage and repair surveys

Damage and repair surveys fall due whenever the ship's hull, machinery, as well as special equipment and installations covered by the Classification have suffered a damage which might affect validity of Class, or if damage may be assumed to have occurred as a consequence of an average or some other unusual event, see Section 1, D.2.3.

### 2.2 Voyage repairs and maintenance

Where repairs to hull, machinery or equipment, which affect or may affect Class are to be carried out by a riding crew during a voyage, they are to be planned well in advance. A complete repair procedure including the extent of proposed repair and the need for Surveyor's attendance during the voyage is to be submitted to and agreed upon with **BCS**. Failure to notify **BCS** in advance of the repairs may result in suspension of the ship's Class.

Maintenance and overhaul to hull, machinery, as well as special equipment and installations in accordance with the recommended manufacturer's procedures and established marine practice and which does not require BCS approval, are not included. However, any repair as a result of such maintenance and overhauls which affects or may affect Class is to be noted in the ship's log and submitted to the attending Surveyor for use in determining further survey requirements.

### 2.3 Conversion surveys

In case of conversion and/or major changes of the ship's hull, machinery, as well as special equipment and installations with effect to the Class designation including Notations, **BCS** approval is to be requested as in the case of new buildings and surveys are to be carried out, as described in Section 1, D.3.

A new or amended Class designation will be assigned, where necessary.

### 2.4 Extraordinary surveys

**BCS** reserve the right to require extraordinary surveys to be held independently of any regular surveys. Such surveys may become necessary for examining the ship's technical condition and are understood to be a part of **BCS**'s Quality Assurance System.

## C. Performance and Scope of Periodical Surveys

### 1. Annual Surveys

#### 1.1 General

Unless a dry docking survey is due, see B.1.8, annual surveys may be carried out with the ship afloat.

#### 1.2 Hull structure and related equipment

**1.2.1** The main structural elements of the hull are to be subjected to a general visual inspection, as far as accessible. Tanks, storage and engine rooms are to be surveyed at random, depending on the ship type and the age and general condition of the ship. Where damages or excessive wastage affecting the Class are suspected, the Surveyor is entitled to carry out further investigations.

**1.2.2** Hatches and covers, bulkhead doors, ramps and any openings in the outer shell shall be surveyed at each opportunity arising, but at least once a year, regarding structural integrity as well as tightness and operability of all closures.

Additionally to the overall survey the following structural members of bow, side and stern doors are to be thoroughly inspected:

- All hinges and the pertinent hydraulic cylinders in way of their securing points,
- All securing elements of the locking devices and stoppers.

**1.2.3** The rudder and maneuvering arrangement and the anchor equipment are to be checked for visible damages. For the related machinery and for operability, see 1.3.

**1.2.4** Depending on the ship's age, the Surveyor may require opening of seawater ballast tanks for visual inspection, particularly if deterioration of the coating or excessive wastage has already been observed at previous surveys, see 2.2.1.

**1.2.5** The foundations and their substructure of special equipment such as weapon systems, particularly on the upper deck, shall be inspected for damages.

**1.2.6** Where deemed necessary to the Surveyor further structures and systems will be included in the scope of the annual survey.

The machinery including electrical installations will be subjected to the following surveys and operational checks:

- General inspection of machinery and boiler rooms, with special regard to the propulsion system, the auxiliary engines, possible fire and explosion sources, and checking of emergency exits as to their free passage,
- External inspection of boilers and pressure vessels, with their appliances and safety devices. For details regarding boilers, see 2.5.2.,
- Inspection and checking of the remote control, quick-closing/stopping devices of pumps, valves, ventilators, etc.,
- Random checking of the remote control and automation equipment,
- Inspection and functional checking of the main and auxiliary steering gear, including their appliances and control systems,
- Checking of all communication systems between bridge and machinery, boiler and steering gear rooms,
- Inspection of the bilge system, including remote control actuators and bilge filling level monitors,
- Checking of the main and emergency power supply systems, including the switch gear and other important electrical installations,
- Survey of explosion-proof installations,
- Random inspection and checking of essential equipment to the Surveyors discretion.

### 1.3 Machinery

### 1.4 Fire extinguishing and fire alarm systems

**1.4.1** The following items/systems are subject to inspection and/or testing, where applicable:

- Fire mains system, including hoses and nozzles,
  - Gas fire extinguishing system,
  - Dry powder fire extinguishing system,
  - Foam fire extinguishing system,
  - Sprinkler system, including water mist sprinkler System,
  - Water and/or foam drencher system,
  - Any other fixed fire extinguishing system provided,
  - Portable fire extinguishers, mobile fire extinguishers, including portable foam application units,
- Fire detection and alarm systems,
  - Emergency stops for ventilation fans, boiler forced draft fans, fuel transfer pumps, fuel oil purifiers,
  - Quick-closing fuel valves,
  - Fire closures, fire dampers, etc.,
  - Fireman's outfits.

**1.4.2 Fire hoses and nozzles**

At least 20 % of the fire hoses and nozzles provided are to be included in the testing of the fire main system.

### 1.4.3 Gas cylinders

Gas cylinders of fixed gas based fire extinguishing systems are subject to level checks every 2 years. These checks may be performed by the ship's staff, provided that the results are recorded and an entry is made into the ship's log.

In the event of loss of more than 10 % of CO<sub>2</sub> (respectively more than 5 % of Halone, where this is still used), recharging is to be arranged for. For periodical testing, see 3.3.5.

### 1.4.4 Fixed fire extinguishing systems

Fixed fire extinguishing systems, such as gas, foam, dry powder or water mist systems, are subject to maintenance by approved or recognized specialists every 2 years.

On the occasion of these inspections all CO<sub>2</sub> hose assemblies must be subjected to a visual check. All CO<sub>2</sub> hose assemblies made of synthetic rubber must be replaced not later than 10 years from the date of manufacture.

### 1.4.5 Portable and mobile fire extinguishers

Portable fire extinguishers and mobile fire extinguishers are subject to inspection by a competent person every year. Maintenance shall be carried out as appropriate in accordance with the manufacturer's instructions. Each extinguisher is to be provided with a label showing the date of inspection and name and signature of the competent person.

Fire extinguishers and associated propellant gas cylinders, if any, are subject to pressure testing every 10 years.

A protocol of the inspections and maintenance work carried out is to be kept on board.

### 1.4.6 Foam concentrate

Foam concentrate for fixed foam fire extinguishing systems is to be examined not later than 3 years after filling into the system, and yearly thereafter. The examination is to be performed by the manufacturers or by an independent recognized laboratory. Reports are to be presented to the Surveyor. Manufacturer's certificates stating the properties of the foam concentrate shall be available onboard for reference.

The foam concentrate for the portable foam applicators is to be renewed on the occasion of every Class renewal.

1.4.7 More extensive regulations of the Naval Authority regarding other inspection intervals / performance of the tests should be observed.

## 1.5 Bridge control stand

On the occasion of the annual survey an operational test of the relevant equipment is to be performed on board of ships assigned the Class Notation NAV-O or NAV-OC.

## 1.6 Equipment related to the Notation NBC

Equipment and provisions, such as closures, ventilation systems, filters, sensors, alarms etc., serving the protection against nuclear, biological or chemical fallout, shall be surveyed according to the instructions established by the parties involved.

## 2. Intermediate Surveys

### 2.1 General

2.1.1 Intermediate surveys shall include all the inspections and checks required for annual surveys. Additionally, the following requirements shall be observed.

2.1.2 The requirements apply to naval ships in general. Additional requirements may have to be observed for particular ship types, due to request of the Naval Authority or in connection with manufacturer's recommendations for special equipment.

## 2.2 Hull structure

**2.2.1** In ships aged **p** to **2p** years, selected seawater ballast tanks are to be examined for corrosion damages and/or damage of their coatings. Depending on the survey result, the survey may be extended to additional tanks. If applicable the procedure as outlined in 2.2.3 shall be followed.

**2.2.2** In ships aged **2p** years and over, during the intermediate survey, all seawater ballast tanks are to be examined for damages to the hull structural elements and to the coating. If applicable the procedure as outlined in 2.2.3 shall be followed.

**2.2.3** If the coating in seawater ballast tanks except the double bottom tanks is found to be in poor condition, but is not renewed, if soft coating has been applied, or if when built, the tanks were not provided with effective corrosion protection, or if corrosion respectively other defects are found, maintenance of Class is to be subject to the tanks in question being examined at annual intervals, and thickness measurements carried out as considered necessary.

Also in case of double bottom tanks, annual surveys may have to be carried out.

**2.2.4** If coating is to be partly or totally renewed, only approved coating is applicable in case of a repair. The whole working procedure including the surface preparation has to be documented.

**2.2.5** Compartments and rooms normally not accessible, or accessible only after special preparations, may be required to be opened for inspection, depending on the ship's age and available information about service conditions.

### 2.2.6 Bow, side and stern doors

Where considered necessary by the Surveyor, additionally crack tests shall be carried out at structural members of bow, side and stern doors as per 1.2.2.

Essentially, the crack tests will cover:

- Main joining welds and their interfacial areas both on the vessel's hull and on the doors,
- Highly stressed areas in way of the centers of rotation of the hinges,
- Highly stressed areas of the locking devices and their stoppers,
- Repair welding.

For crack detection the dye penetration method or the magnetic particle inspection method shall be employed, and a test protocol is to be prepared.

## 2.3 Machinery and electrical installations

### 2.3.1 Measurements

The following measurements are generally to be performed unless it can be proved by valid protocols that they have been carried out recently:

- Crank web deflection, main engine(s),
- Crank web deflection, auxiliary diesel engine(s) (where relevant),
- Axial thrust bearing clearance of shafting system(s),
- Axial thrust bearing clearance of main and auxiliary gas turbine rotors (where applicable),
- Insulation resistance of generators and electrical motors, including cabling and switch gear.

### 2.3.2 Operational tests

In addition to the requirements under 1.3, the following system components are to be subjected to operational tests:

- Emergency generating set, including emergency switchboard (where applicable),
- Emergency bilge valve(s),
- Bilge, ventilation and monitoring systems for the carriage of dangerous substances,
- Drainage facilities of starting-air and control-air receivers,
- General operational test of the machinery and electrical installation to demonstrate unrestricted operability, as indicated by the Surveyor.

### 2.3.3 Automation equipment

The monitoring equipment and the automated functions of the machinery installation are to be subjected to operational trials under service conditions in port. The bridge remote control equipment of the propulsion system will be examined as required by the Surveyor.

## 2.4 Periodical surveys of propeller shafts and tube shafts, propellers and other systems

The periodical surveys and tests of propeller shafts and tube shafts, propellers and other systems defined in B. 1.6 are to be performed as follows.

### 2.4.1 Propeller shafts and tube shafts

#### 2.4.1.1 Normal survey

The prerequisites are defined in B.1.6.1.1. It is distinguished between:

- Survey with drawing of the shaft,
- Survey without drawing of the shaft.

#### 2.4.1.1.1 Survey with drawing of the shaft

The scope of normal survey consists in the following:

- Dismantling of propeller and key, where fitted, visual inspection of all parts of the shaft especially the cone, the keyway, the bearing contact areas of the shaft, the bearings, and the thread of the propeller nut, or the fillet of the flange, examination of the propeller fit,
- Non-destructive examination by an approved crack detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of the keyway, or the fillet of the flange in case of a solid flange coupling,
- Examination of the bearing clearances and/or wear down before dismantling and after reassembling of the shaft with recording of the values measured,
- Overhaul of the shaft sealing glands according to manufacturer's instructions (sealing rings, liners, etc.).

#### 2.4.1.1.2 Survey without drawing of the shaft

Where the prerequisites as defined in B. 1.6.1.1.2 apply, for oil lubricating arrangement the scope of normal survey without drawing of the shaft consists in the following:

- Examination of all accessible parts of the shaft including the propeller connection to the shaft,
- Non-destructive examination by an approved crack-detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of the keyway for keyed propellers, or of the forward part of the aft shaft taper for keyless propellers, or of the after fillet flange area of the shaft for solid flange coupling propellers. The area to be examined is to be

- sufficiently exposed, if necessary by shifting of the propeller shaft or backing-off of the propeller,
- Examination of the bearing clearances, respectively wear down of the aft bearing,
  - Overhaul of the shaft sealing glands according to manufacturer's instructions (sealing rings, liners, etc.),
  - Examination of the records of all regularly carried out lubricating oil analyses,
  - Examination of the records of the oil consumption and the bearing temperatures.
- Examination and overhaul of the oil sealing glands according to manufacturer's instructions (sealing rings, liners, etc.),
  - Examination of the bearing clearances and/or wear down of the shaft with recording of the values measured,
  - Examination of the lubricating oil analysis and consumption to be within permissible limits,
  - For keyed propellers, performing a non destructive examination by an approved crack detection method of about one third of the length of the taper from the large end, for which dismantling of the propeller is required, examination of the propeller fit.

Where doubts exist regarding the findings, the shaft is to be drawn to permit an entire examination.

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

#### 2.4.1.2 Modified survey

The prerequisites are defined in B. 1.6.1.2. It is distinguished between:

- Survey with exposing the aft bearing contact area of the shaft,
- Survey without exposing the aft bearing contact area of the shaft.

##### 2.4.1.2.1 Survey with exposing the aft bearing contact area of the shaft

The scope of the modified survey consists in the following:

- Drawing the shaft to expose the aft bearing contact area of the shaft,
- Examination of the forward bearing as far as possible and of all accessible parts of the shaft including the propeller connection to the shaft,

##### 2.4.1.2.2 Survey without exposing the aft bearing contact area of the shaft

Where the prerequisites as defined in B. 1.6.1.2.2 apply, the scope of the modified survey without exposing the aft bearing contact area of the shaft consists in the following:

- Examination and overhaul of the oil sealing glands according to manufacturer's instructions (sealing rings, liners, etc.),
- Examination of the bearing clearances and/or wear down of the shaft with recording of the values measured,
- For keyed propellers, performing a non destructive examination by an approved crack detection method of about one third of the length of the taper from the large end, for which dismantling of the propeller is required, examination of the propeller fit.

In addition to this the survey shall include the following:

- Examination of the records of all regularly carried out lubricating oil analyses,
- Examination of the records of the oil consumption and the bearing temperatures.

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

#### **2.4.1.3 Partial survey**

The prerequisites are defined in B.1.6.1.3. The partial survey consists in the following:

- Checking of the oil sealing for leakages,
- Examination of the bearing clearances and/or wear down of the shaft with recording of the values measured,
- Examination of the records of the lubricating oil analysis,
- Examination of the records of the oil consumption and the bearing temperatures.

Where the propeller is fitted to a keyed shaft taper, in addition:

- Dismantling of the propeller and examination of the propeller fit,
- Non-destructive examination by an approved crack-detection method of the aft end of the cylindrical part of the shaft and of about one third of the length of the taper from the large end and of the area of keyway.

are to be performed.

Where doubts exist regarding the findings, the shaft is to be further dismantled, respectively drawn.

#### 2.4.2 Propellers

Propellers are to be examined visually on the occasion of each propeller shaft or tube shaft survey.

Damages, such as cracks, deformation, cavitation effects, etc. are to be reported and repaired at the Surveyor's discretion.

Controllable pitch propellers are to be checked for oil leakages. The function of the controllable pitch propellers has to be tested. The maintenance according to manufacturer's instructions has to be checked.

#### 2.4.3 Other systems

As far as practicable, the gearing and control elements of rudder and steering propellers are to be examined through inspection openings. For other systems such as pod propulsion systems, pump jet units, etc., the scope of survey is to be agreed with BCS Head Office. The maintenance according to manufacturer's instructions is to be checked. A function test is to be carried out.

### 2.5 Steam boilers

**2.5.1** Steam boilers are to be inspected internally and externally at nominal intervals corresponding to half the Class period  $p$ , preferably in connection with an intermediate or Class Renewal Survey. The maximum interval between internal surveys shall not exceed 3 years.

For ships exceeding  $2p$  years of age, boilers may be required to be inspected internally at annual intervals, depending on the function/importance of the boiler.

#### 2.5.2 External inspection

The operability and general condition of the entire boiler, including its valves and fittings, pumps, piping, insulation, foundation, control and regulating systems and its protective and safety equipment, are to be examined. Also, the boiler manual, operating instructions and qualifications of the operating personnel are to be checked, if required by the Naval Authority.

#### 2.5.3 Internal inspection

Where deemed necessary by the Surveyor, the boiler is to be cleaned on the water and flue gas sides and, if required, its outside surfaces are to be uncovered as well, so that all walls subject to pressure may be examined.

Where the design of the boiler does not permit an adequate internal inspection, hydraulic tests may be required. It is left to the Surveyor's discretion to have the internal inspection supplemented by hydraulic tests, if considered necessary on account of the general condition/appearance of the boiler.

Where there are doubts concerning the thickness of the boiler walls, measurements shall be made using a recognised gauging method. Depending on the results, the allowable working pressure for future operation is to be determined.

The hydraulic pressure test is to be carried out to a test pressure of 1.3 times the allowable working pressure. Only after repairs of major damages the test pressure shall be 1.5 times the allowable working pressure. If the maximum allowable working pressure is less than 2 bar, the test pressure shall be at least 1 bar above the maximum allowable working pressure. In no case the test pressure should exceed the test pressure applied during the first inspection of the boiler after completion.

**2.5.4** Beyond the above periodical inspections, the Surveyor may require hydraulic tests or extraordinary

inspections to be performed on other occasions, e.g. following repairs and maintenance work.

### 3. Class Renewal Surveys

#### 3.1 General

**3.1.1** In addition to the inspections and checks to be carried out on occasion of the annual and intermediate surveys, for Class renewal the following requirements shall be observed.

**3.1.2** The Class Renewal Survey is in principle to be held when the ship is in dry dock or on a slipway, unless a dry docking survey has already been carried out within the admissible period, see B.1.8.

The ship is to be placed on blocks of sufficient height so that the keel, the bottom plating, the rudder and any other installations at the bottom can be examined in a satisfactory manner.

**3.1.3** For surveys normally requiring dry-docking, and where the Notation IWS has been assigned, the requirements according to 4. have to be observed.

#### 3.2 Hull structure

##### 3.2.1 Class Renewal I

Class Renewal I has to be performed at the end of the first Class period p. For definition see B.1.4.2.

##### 3.2.1.1 Hull, general

At the Surveyor's discretion, the survey on principle covers the whole hull structure, particularly those areas which from experience are known to be exposed to fatigue and corrosion, such as openings in the shell and in the deck including doors and hatch coamings and covers, tanks, engine foundations and ends of superstructures. As a matter of principle, all machinery spaces, dry spaces, store rooms, pipe tunnels,

cofferdams and void spaces are to be examined, including the piping systems.

##### 3.2.1.2 Preparation for inspection

All spaces required to be inspected are to be cleared, cleaned and ventilated where necessary at the Surveyor's discretion so that all structural parts can be examined. For tanks, see 3.2.1.3.

Where the structural elements are covered, the Surveyor may require parts of the covering to be removed.

If deemed necessary by the Surveyor, defective cement and asphalt covering is to be removed. The steel work is to be examined before painting or before the cement or other coverings are renewed.

##### 3.2.1.3 Tank surveys

The seawater ballast tanks are to be inspected at the Surveyor's discretion, if applicable; the procedure as outlined in 2.2.3 shall be followed.

Fuel oil, lubricating oil and fresh water tanks need not to be emptied, if their tightness can be verified by an external examination while they are completely filled and there is no reason for doubt as to their unobjectionable condition. However, fore and after peak are in any case subject to internal examinations at each Class Renewal Survey.

##### 3.2.1.4 Tightness tests

Each compartment of the double bottom and all tanks, the boundary plating of which forms part of the ship's main structure, are to be subjected to pressure tests. Fuel oil, lubricating oil and fresh water tanks may be tested by filling with the respective liquid.

The test pressure applied is to correspond to a head of water up to the top of the overflow/air pipe or up to the hatch of a tank, where applicable, whichever is higher.

The tightness of pipe tunnels outside the inner bottom, and of void spaces, may be tested by air pressure. Air pressure testing of other spaces is to be agreed with the Surveyor from case to case. The overpressure must not exceed 0,2 bar.

### 3.2.1.5 Thickness measurements

If the Surveyor has reason to suspect inadmissible corrosion, he may require the rust to be removed from parts of the structure and thickness measurements to be carried out, see 6.

### 3.2.1.6 Rudder, equipment, deck openings, etc.

The Class Renewal Survey also covers other parts essential for the operation and safety of the ship, such as rudder and steering gear, watertight doors, sluice valves, air and sounding pipes, gas freeing and safety arrangements of cargo tanks, life-boat davits, companionways, hatches, scuppers and water drain pipes with their valves, fire protecting arrangements, masts, anchors, anchor chains and hawsers.

Doors, if any, are to be checked, see 2.2.6.

The rudder, rudder couplings and bearings, as well as the stock are to be surveyed in mounted condition, the rudder clearance to be measured and documented. The steering gear is to be subjected to an operational trial.

If considered necessary in view of the inspection results, the rudder and/or parts of the steering gear may have to be dismantled.

### 3.2.1.7 Engine room structure

Particular attention is to be given to tank tops, shell plating in way of tank tops, brackets connecting side shell frames and tank tops, engine room bulkheads in way of tank top and the bilge wells. Where wastage is evident or suspected, thickness measurements are to be carried out.

## 3.2.2 Class Renewal II

**3.2.2.1** The requirements for the second Class renewal include those for Class Renewal I. Additionally, the following investigations are to be carried out.

**3.2.2.2** The structural parts behind ceilings, floor coverings and insulation are to be examined, as required by the Surveyor and depending on the general condition of the ship, see 3.2.1.2.

**3.2.2.3** In principle, all tanks are to be examined internally.

Lubricating oil and fresh water tanks are to be at least examined at random, as required by the Surveyor.

In the case of seawater ballast tanks the procedure as outlined in 2.2.3 shall be followed, if applicable. Peak tanks see 3.2.1.3

**3.2.2.4** The chain cables are to be ranged so that they can be examined for wear and other damages throughout their length. The mean diameter of the anchor chain cables is to be determined on at least 3 links per length.

**3.2.2.5** For thickness measurements, see 6.

## 3.2.3 Class Renewal III and subsequent ones

**3.2.3.1** The requirements for the third and the subsequent Class renewals include those for the Class Renewal II. Additionally, the following investigations are to be carried out.

**3.2.3.2** Ceilings, linings and insulation of all spaces adjacent to the shell plating and the inner bottom shall be removed, as indicated by the Surveyor, to enable the steel structure to be examined in detail.

For Class Renewals IV and subsequent ones the inner bottom ceilings are to be completely removed and the tank top is to be carefully cleaned, such as to enable proper assessment of the tank top's condition.

The wall lining underneath windows in the outer shell is to be lifted as required by the Surveyor so that the structure behind may be examined.

**3.2.3.3** All tanks are to be examined internally. The fuel oil, lubricating oil and fresh water tanks are to be examined internally and tested to the maximum working overpressure, at the Surveyor's discretion, see 3.2.1.3. In the case of seawater ballast tanks the procedure as outlined in 2.2.3 shall be followed, if applicable. For peak tanks see 3.2.1.3.

**3.2.3.4** The rudder body is to be examined. The connections to the rudder stock and pertinent securing devices are to be inspected. For clearances, see 4.2.2.

The rudder stock is to be surveyed as far as accessible. If deemed necessary in view of findings during this external inspection, the stock is to be dismantled. In way of the bearings, stock and pintle are to be examined for corrosion.

**3.2.3.5** The weight of the anchors is to be checked.

### **3.3 Machinery including electrical installations**

#### **3.3.1 General**

**3.3.1.1** Except for individual machinery components as indicated in the following, the scope of all Class Renewal Surveys related to the machinery including electrical installations is identical. If the Continuous Class Renewal system is applied, the indications according to B.1.5 are to be observed.

##### **3.3.1.2 Surveys requiring dry docking**

While the ship is in dry dock, the sea inlet and discharge valves are to be examined as to their condition and to be opened up and overhauled once within a Class period p.

Bow thrusters and positioning equipment are to be subjected to a general survey, and to trials upon floating of the ship.

For propeller(s), propeller and stern tube shaft(s), see 2.3.4.

#### **3.3.2 Propulsion system**

**3.3.2.1** Inspection of the propulsion system is mainly to cover:

- Intermediate shafts and bearings, including thrust bearings,
- Gearing,
- Mechanical and flexible couplings,
- Turning gear,
- The main propulsion engines or gas turbines, see 3.3.2.2 and 3.3.2.3.

Spring elements made of rubber ring clutches with or without plies of fabric and under shear load, and other rubber or fibre reinforced plastic couplings are to be renewed, if required on account of negative inspection results.

##### **3.3.2.2 Main propulsion engines**

The following components are to be inspected and checked in the dismantled condition, where deemed necessary by the Surveyor:

- Cylinders, cylinder covers, pistons, piston rods and bolts, cross heads, crankshaft and all bearings,
- Camshaft, with drive and bearings,
- Tie rods, frame, foundation and fastening elements,

- Injection system, attached pumps and compressors, superchargers, suction and exhaust lines, charging air coolers, filters, monitoring, control, protective and safety devices, starting, reversing and maneuvering equipment.

**Note:**

*In case of medium speed diesel engines, dismantling and replacement of main and crank bearings may be postponed until the service life limits have been reached. The acceptable intervals between overhauls are determined by BCS Head Office.*

### 3.3.2.3 Main propulsion gas turbines

On occasion of each Class renewal, the vibration behaviour of the main propulsion gas turbines is to be investigated, possibly by regular checks during operation. Depending on the result and as required by the Surveyor, the turbine casing(s) will have to be opened up and the rotor(s), bearings, etc. inspected in detail.

The safety arrangements of the turbines are to be tested.

### 3.3.3 Auxiliary engines

For all auxiliary engines, the survey scope is identical to that applying to the main engines. A reduction in the scope of survey may be agreed to upon examination of the maintenance protocols.

### 3.3.4 Steam boilers

**3.3.4.1** For internal and external inspections of boilers, see 2.5.

**3.3.4.2** Steam pipes and heating coils shall be examined according to agreed procedures.

### 3.3.5 Pressure vessels

**3.3.5.1** Pressure vessels are to be inspected internally and externally.

Pressure vessels for which pressure [bar] times cubic capacity [l] is less than or equal to 200 are to be surveyed on the occasion of checking of the pertinent piping system.

**3.3.5.2** Where pressure vessels cannot be satisfactorily examined internally and where their unobjectionable condition cannot be clearly stated during the internal inspection, approved non-destructive test methods and/or hydraulic pressure tests are to be carried out.

The hydraulic pressure test is to be performed at a test pressure of 1,5 times the maximum allowable working pressure. If the maximum allowable working pressure is less than 2 bar, then the test pressure should be at least 1 bar more than the maximum allowable working pressure. Pressure vessels manufactured in accordance with DIN Standard 4810 are, subject to that Standard, to be tested to 1,3 times the admissible working pressure. The test pressure must in no case exceed the initial test pressure.

### 3.3.6 Auxiliary machinery, equipment and piping

The following components are to be inspected and tested in dismantled condition, where deemed necessary by the Surveyor:

- All pumps of the essential systems,
- Air compressors, including safety devices,
- Separators, filters and valves,
- Coolers, pre-heaters, see 3.3.5,
- Main and auxiliary steering gear,
- Anchor and other windlasses, including drives,
- Piping, pipe connections, compensators and hoses,
- Emergency drain valves and bilge piping systems,

- Tank filling level indicators,
- Installations preventing the ingress of water into open spaces,
- Fresh water distillation plant, where provided ,
- Oil purifier and sewage systems,
- Additional systems and components, where deemed necessary by the Surveyor, as well as special equipment and installations if included in the scope of Classification.

### 3.3.7 Automation equipment

The monitoring equipment and the automated functions of the machinery installation are to be subjected to operational trials under service conditions in port. The bridge remote control equipment of the propulsion system will be examined as required. Details are given in the **BCS** survey programme AUT 4, see also 2.3.3.

### 3.3.8 Electrical installations

#### 3.3.8.1 Propulsion machinery

If the ship is propelled by electrical machinery, the propulsion motors, the propulsion generators and exciters, particularly the windings of these machines, and their ventilating systems are to be examined and tested. Checking of the electric switch gear for operability is to cover also the protective, safety and interlocking devices.

The electric cables and their connections are to be inspected.

The insulation resistance of all electric machinery and equipment is to be tested.

#### 3.3.8.2 Dynamic positioning systems

Dynamic positioning systems according to Section 2, C.3.3, including control systems, are to be subjected to operational tests.

#### 3.3.8.3 Auxiliary machinery

The electrical machinery and equipment, including the generators, the motors of the essential services, the switch gear including its protective and interlocking devices, as well as the cable network are to be inspected externally.

The insulation resistance is to be measured.

#### 3.3.8.4 Explosion protection

Electrical installations and equipment located in spaces in which there is a risk of inflammable gas or vapour/air mixtures accumulating, are to be checked as to the explosion protection provided.

### 3.3.9 Pipes in tanks

Where pipes are led through tanks, they are to be examined and, if required by the Surveyor, subjected to hydraulic tests, if for the respective tanks an internal examination is required according to 3.2.1.3. Depending on the results obtained, thickness measurements may be required.

### 3.3.10 Fire extinguishing and fire alarm systems

**3.3.10.1** Proof is to be furnished to the Surveyor that the entire fire extinguishing equipment is ready for operation and in a satisfactory condition.

For details and trials, see 1.4.

Emergency exits/escapes are to be inspected.

CO<sub>2</sub> cylinders (Halon bottles, where still used), see 1.4.3.

On the occasion of every Class Renewal Survey all CO<sub>2</sub> hose assemblies must be subjected to a visual check. All CO<sub>2</sub> hose assemblies made of synthetic

rubber must be replaced not later than 2p years from the date of manufacture.

**3.3.10.2** Periodical tests of CO<sub>2</sub> cylinders for fire extinguishing purposes are to be carried out at intervals not exceeding 2p years. At least 10 % of the gas cylinders provided are to be subjected to an internal inspection and hydrostatic test. Halon containers of existing fixed Halon fire-extinguishing systems are exempted from this requirement.

Irrespective thereof, on the occasion of recharging CO<sub>2</sub> cylinders and Halon containers are to be tested, if the last test dates back 2p years or more.

Following a hydraulic pressure test, the vessels or bottles are to be carefully dried.

**3.3.10.3** In the case of vessels for powder extinguishing agents, periodical pressure tests may be dispensed with, provided that their internal inspection does not reveal any deficiencies.

**3.3.10.4** The intervals between surveys as referred to may be reduced, depending on the findings.

#### **3.3.11 Spare parts**

Spare parts are to be checked for completeness as per the Rule requirements and/or according to the lists approved by **BCS** and kept in the ship's files, as well as for their operability.

#### **3.3.12 Trials**

Upon completion of the surveys for Class renewal, the Surveyor must be satisfied that the entire machinery installation including electrical installations and steering gear, as well as special equipment and installations are operable without any restrictions. In case of doubt, trials and/or operational tests may be necessary.

### **4. Dry Docking Surveys**

#### **4.1 General**

For the survey the ship is to be placed on sufficiently high and secure blocks, so that all necessary examinations can be carried out. It may be necessary to clean the bottom and outer shell and/or remove rust from some areas.

#### **4.2 Hull bottom survey**

**4.2.1** The survey covers an examination of the bottom and side plates of the shell plating, including any attachments, the rudder, the scuppers and water drain pipes, including their closures.

#### **4.2.2 Steering gear**

The rudder, rudder couplings and bearings, as well as stocks and pintles, are to be surveyed in place, the rudder clearance is to be measured and documented. The steering gear is to be subjected to an operational trial.

If considered necessary in view of the inspection results, the rudder or parts of the steering gear will have to be dismantled.

Bow thrusters are normally to be inspected in place.

#### **4.2.3 Machinery and propulsion systems**

**4.2.3.1** For propeller(s), propeller shaft(s), stern tube(s), see 2.3.4.

**4.2.3.2** Sea and discharge valves - including those of special equipment, if any - are to be checked as to their condition during each dry docking survey and to be opened up and overhauled once within a period of Class.

### **5. In-Water Surveys**

#### **5.1 Approvals**

**5.1.1** The diving firm assisting in in-water surveys must be approved by **BCS** for this purpose.

**5.1.2** The validity of the approval will depend on the continued qualification for satisfactorily carrying out the work required. The approval will have to be renewed after a period not exceeding 5 years.

## **5.2 Performance of survey**

**5.2.1** Unless accessible from outside with the aid of the ship's trim and/or heel, underwater parts are to be surveyed and/or relevant maintenance work is to be carried out with assistance by a diver whose performance is controlled by a Surveyor, using an underwater camera with monitor, communication and recording systems.

**5.2.2** Surveys of the underwater body are to be carried out in sufficiently clear and calm waters.

The ship should be in light ship condition.

The shell sides below the water-line and the bottom must be free from fouling.

**5.2.3** The underwater pictures on the surface monitor screen must offer reliable technical information such as to enable the Surveyor to judge the parts and/ or the areas surveyed.

**5.2.4** Documentation suited for video reproduction including voice is to be made available to **BCS**.

## **5.3 Additional examinations**

**5.3.1** Where, for instance, grounding is assumed to have taken place, the Surveyor may demand individual parts of the underwater body to be additionally inspected from inside.

**5.3.2** If during the in-water survey damages are found which can be assessed reliably only in dry-dock or require immediate repair, the ship is to be dry docked. If the coating of the underwater body is in a condition

which may cause corrosion damages affecting ship's Class to occur before the next dry docking, the ship is to be dry docked.

## **6. Thickness Measurements and Corrosion Tolerances**

### **6.1 General**

#### **6.1.1 Definitions**

Substantial corrosion is an extent of corrosion such that assessment of corrosion pattern indicates wastage in excess of 75 % of allowable margins, but within acceptable limits.

Soft coating is solvent-free coating on base of wool grease, grease, mineral oils and/or wax that remains soft so that it wears off when touched.

Poor condition is a breakdown of coating over 20 % or more of areas, or hard scale at 10 % or more of areas under consideration.

Good condition is a condition with only minor spot rusting.

Suspect areas are locations showing substantial corrosion and/or are considered by the Surveyor to be prone to rapid wastage.

Close-up examination is an examination where the details of structural components are within the close visual inspection range of the surveyor, i.e. normally within reach of hand.

**6.1.2** The thickness of structural elements is checked by measurements, in order to assess whether or not the values stipulated in the Construction Rules are observed, taking into account the admissible tolerances. Unless severe corrosion has occurred owing to particular service conditions, thickness measurements will not be required until Class Renewal II, see 3.2.2 and 3.2.1.5.

**6.1.3** Thickness measurements are to be carried out in accordance with recognized methods and by authorized personnel or companies, see 6.2. Rust and

contamination are to be removed from the components to be examined. The Surveyor is entitled to require check measurements or more detailed measurements to be performed in his presence. The thickness measurements are to be witnessed by the Surveyor on board to the extent necessary to control the process.

The scope of thickness measurement as well as the reporting shall be fixed in a survey planning meeting between the Surveyor, representatives of the Naval Authority and the approved thickness measurement operator/firm well in advance of measurements and prior to commencing the survey.

## **6.2 Authorization**

**6.2.1** The personnel or the company entrusted with thickness measurements as well as the procedure for documentation must be approved by BCS for this purpose.

**6.2.2** The validity of the approval will depend on the continued qualification. The approval will have to be renewed after a period not exceeding 3 years.

## **6.3 Scope of measurements**

### **6.3.1 Main hull structural elements**

In Class Renewal II and all subsequent ones the plate thickness of the main hull (essential longitudinal and transverse) structural elements are to be checked by measurements. The number of measurements depends on the ship's maintenance condition and is left to the Surveyor's discretion. The minimum requirements for thickness measurements on the occasion of Class Renewal Surveys are stated in Table 3.1, depending on the ship's age. Respective thickness measurements to determine the general level of corrosion are to be carried out.

**6.3.2** The extent of thickness measurements may be reduced, in comparison with those stated in Table 3.1, provided during the close-up examination according to Table 3.2 the Surveyor satisfies himself that there is no

structural diminution, and the protective coating, where applied, continues to be effective.

The Surveyor may extend the scope of the thickness measurement as deemed necessary. This applies especially to areas with substantial corrosion.

Transverse sections should be chosen where largest corrosion rates are suspected to occur or are revealed by deck plating measurements.

### **6.3.3 Seawater ballast tanks**

In the case of major corrosion damages, the structural elements of seawater ballast tanks are to be checked by thickness measurements, see 2.2.3.

**6.3.4** Where special reasons exist, the Surveyor may demand thickness measurements to be carried out already on the occasion of Class Renewal I, also outside the area of 0.5 L amidships, see 3.2.1.5. The same applies in the case of conversion or repair of a ship.

**Table 3.1 Class Renewal Surveys (Hull) - Minimum Requirements for Thickness Measurements**

Class Renewal Survey [No.] and ship's age [years]			
I. age ≤ p	II. p < age ≤ 2p	III. 2p < age ≤ 3p	IV. and subsequent, age > 3p
Suspect areas throughout the ship			
Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table 3.2			
	One transverse section within 0.5 L amidships	Two transverse sections within 0.5 L amidships	Three transverse sections within 0.5 L amidships
		All covers and coamings (plating and stiffeners)	
		All exposed main deck plating within 0.5 L amidships	All exposed main deck plating full length
		All wind- and water strakes within 0.5 L amidships	All wind- and water strakes full length
		Internals in forepeak tank	Internals in forepeak and after peak tanks
		Lowest strake and strakes in way of tween decks of selected transverse bulkheads together with internals in way	Lowest strake and strakes in way of tween decks of all transverse bulkheads together with internals in way
			Representative exposed superstructure deck plating
			All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space and aft ends of tanks
			Plating of seachests. Shell plating in way of overboard discharges as considered necessary by the Surveyor
			Each bottom plate including lower turn of the bilge
			Duct keel or pipe tunnel plating and internals

**6.3.6 Hull equipment**

**6.3.5** In order to be used as a basis for Class renewal, thickness measurements should, as far as practicable, be carried out already on the occasion of the p-1, i.e. fourth respectively fifth annual survey.

In Class Renewal III and all subsequent Class renewals the cross sectional areas of the anchor chain cables and the weights of the anchors are to be determined.

The mean diameters of the anchor chain cables are to be determined by representative measurements, approx. 3 links per length of 27.5 m, made at the ends of the links where the wear is greatest.

**6.4 Corrosion and wear tolerances**

**6.4.1** Where thickness measurements according to 6.3 result in corrosion and wear values exceeding those stated in the following, the respective hull structural elements will have to be renewed.

**Table 3.2 Class Renewal Surveys - Minimum Additional Requirements for Close-up Surveys**

Class Renewal survey [No.] and ship's age [years]			
I. age ≤ p	II. p < age ≤ 2p	III. 2p < age ≤ 3p	IV. and subsequent, age > 3p
Selected shell transverse frames in one forward and one aft compartment and associated tween deck spaces	Selected shell transverse frames in all compartments and associated tween deck spaces	All shell frames in the forward lower compartment and 25 % of frames in each of the remaining compartments, and tween deck spaces including upper and lower end attachments and adjacent shell plating	All shell frames in all compartments and tween deck spaces including upper and lower end attachments and adjacent shell plating
One transverse bulkhead in one selected compartment including bulkhead plating, stiffeners and girders	One transverse bulkhead in each compartment including bulkhead plating, stiffeners and girders Forward and aft transverse bulkhead in one side water ballast tank including stiffening system	All compartment transverse bulkheads including bulkhead plating, stiffeners and girders All transverse bulkheads in water ballast tanks including stiffening system	Other items: As for class renewal survey No. III
All hatch covers and coamings (plating and stiffeners)			
	One transverse web frame or watertight transverse bulkhead with associated plating and framing in two representative water ballast tanks of each	All transverse web frames or watertight transverse bulkheads with associated plating and framing in each water ballast tank	
	Selected areas of all deck plating and under deck structure inside line of hatch openings between all hatches Selected areas of inner bottom plating	All deck plating inside line of hatch openings between hatches All areas of inner bottom plating	

**Note :**

*Close-up survey of transverse bulkheads to be carried out at the following levels: - immediately above the inner bottom and immediately above the tween decks, as applicable - mid-height of the bulkheads for holds without tween decks - immediately below the main deck plating and tween deck plating*

**6.4.2 Local strength**

Maximum permissible reduction of the mean diameter of chain links: 10 %.

**6.4.2.1 Steel**

Maximum permissible reduction in weight of anchors: 10 %.

Where applicable, the maximum permissible large surface reduction  $t_k$  of plate thickness and web thickness of profiles is:

- $t_k = 0.5 \text{ mm}$  in general
- $t_k = 0.7 \text{ mm}$  for lubrication oil, gas oil or equivalent tanks
- $t_k = 1.0 \text{ mm}$  for water ballast tanks
- $t_k =$  as agreed with BCS in case of special applications

If  $t_k = 0.0 \text{ mm}$ , the fabrication tolerances as defined in **BCS** Rules Chapter 2- Material, shall not be exceeded. Maximum permissible locally limited reduction of thickness: 0.1t.

**6.4.2.2 Aluminium alloys**

If the measures for corrosion protection described in the **BCS** Rules, Chapter 102 - Hull Structures and Ship Equipment, Section 3, G. are fully applied, the corrosion reduction  $t_k$  can be assumed as 0,0 mm for the aluminium alloys defined in D. of the same Section. In no case the fabrication tolerances as defined in **BCS** Rules Chapter 2 - Material shall be exceeded.

**6.4.3 Anchor equipment****7. Damage and Repair Surveys**

**7.1** Where damage has occurred to the ship's hull, machinery including electrical installations or special equipment and installations, the automatic/ remote-control systems, etc., the damaged parts are to be made accessible for inspection in such a way that the kind and extent of the damage can be thoroughly examined and ascertained, see also Section 1, D.2.3.

In the case of grounding, dry docking or, alternatively, an in-water survey is required.

**7.2** The repair measures are to be agreed with the Surveyor such as to render possible confirmation of the Class without reservations upon completion of the repairs. In general, a Class confirmation with Conditions of Class, e. g. in the case of a preliminary repair ("emergency repair"), requires to be approved by **BCS** Head Office.

**7.3** Surveys conducted in the course of repairs are to be based on the latest experience and instructions by **BCS**. In exceptional cases advice is to be obtained from **BCS** Head Office, in particular where doubts exist as to the cause of damage.

**7.4** For older ships, in the case of repairs and/or replacement of parts subject to Classification, as a matter of principle, the Construction Rules in force

during their period of construction continue to be applicable.

This does not apply in the case of modifications required to the structure in the light of new knowledge gained from damage analyses, with a view to avoiding recurrence of similar damages.

**7.5** Regarding the materials employed and certificates required, the requirements for new buildings are applicable, see Section 1, D.3.

**7.6** Regarding damages or excessive wastage beyond allowable limits that affect the ship's Class See Section 1, D.2.4.



**SECTION 4 GENERAL INFORMATION AND PROJECT DATA**

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## SECTION 4

## GENERAL INFORMATION AND PROJECT DATA

- Mine warfare, etc.

**A. Scope**

In order to estimate the scope of Classification and Services, **BCS** need to be provided with the following general information and data as far as already available in the initial phase of the project.

**B. Basic Design Data for Initial Information****1. Functional military demands**

Relevant information covers:

- Planned type of ship, see Section 2, C.
- Military tasks, such as:
  - General patrol,
  - Anti air warfare,
  - Anti submarine warfare,
  - Flight operations,
  - Military transport,
  - Landing operations,

**2. Detailed military demands**

The detailed military demands include:

- Military loads caused by the weapons and sensors, etc. of the naval ship and influencing the hull girder strength,
- Extent/location of storage rooms for explosives,
- Military loads for transport tasks, if any
- Acoustic and electromagnetic demands,
- Equipment and materials causing radiation hazards,
- Shock strength demands,
- Special demand to withstand local impacts,
- Residual strength demands,
- Damage control zones,
- Fire resisting divisions,
- Extent of NBC (nuclear-biological-chemical) citadel, if requested
- Scope of redundancies for main propulsion and auxiliaries,
- Replenishment at sea,
- Planned duty conditions, like battle stations, combat readiness, cruise, etc.

**1. General****3. Basic ship parameters**

The basic parameters are:

- Main design parameters,
- Area of operation,
- Ambient conditions,
- Intact and damage stability requirements,
- Operational profile,
- Expected lifetime [years],
- Materials for construction including special properties, corrosion protection measures, etc.

**4. Regulations**

Additional international and national regulations, as well as regulations of the Naval Authority to be applied.

**5. Building Specification**

Preliminary building specification or technical part of a building contract, if already available.

**6. Strength Calculations**

Intended direct strength calculations of the hull structures, as well as extent and type of software to be used, are to be stated.

**7. Updates and Changes**

Updates and changes of all relevant design assumptions shall be forwarded to **BCS**.

**C. Main Ship Parameters**

For the definition of parameters only SI units (metric system) should be used.

**2. Principal Dimensions****2.1 Length L**

The length **L** of the ship is the length from the moulded side of the plate stem to the fore side of the stern or transom measured on the waterline at draught **T**. Other forms of stem are to be specially considered.

**2.2 Length  $L_{OA}$** 

The length over all  $L_{OA}$  is the distance between the most forward and most aft element of the ship, permanent outfit included, measured parallel to the design waterline.

**2.3 Breadth B**

The breadth **B** is the maximum moulded breadth at the design waterline.

**2.4 Breadth  $B_{max}$** 

The breadth  $B_{max}$  is the greatest moulded breadth of the ship. For ships with unusual cross section the breadth will be specially considered.

**2.5 Depth H**

The depth **H** is the vertical distance, at the middle of the length **L**, from the moulded base line to top of the deck beam at side on the uppermost continuous deck.

**2.6 Draught T**

The draught **T** is the vertical distance, at the middle of the length **L**, from base line to deepest design waterline, as estimated for the lifetime of the ship.

### 2.7 Draught $T_{max}$

The draught is  $T_{max}$  the vertical distance between the lowest point of the immersed hull including appendages (e.g. domes, rudders, propellers, thrusters, etc.) and the design waterline, movable parts considered retracted.

## 3. Ship Speed

### 3.1 Speed $v_0$

Expected maximum, continuous ahead speed  $v_0$  [kn] of the ship in calm water at the draught  $T$  when the total available rated driving power is exclusively used for propulsion purposes.

### 3.2 Speed $v_{max}$

Expected maximum ahead speed [kn] of the ship in calm water at the draught  $T$ , when the total available maximum driving power is exclusively used for propulsion purposes. This speed is related to an overload condition, permissible only for a defined and relatively short time period.

### 3.3 Speed $v_M$

Expected economic, continuous ahead cruising speed [kn] of the ship, in calm water at the draught  $T$ , which provides the maximum radius of action.

## 4. Rated Driving Power

The rated driving power [kW] is defined as continuous power to be delivered by the propulsion machinery when running at rated speed and with the total available power exclusively used for propulsion purposes.

## 5. Auxiliary Electrical Power

The auxiliary electrical power [kVA] is defined as the continuous electrical power which is not directly used for propulsion of the ship at continuous speed  $v_0$ , but for driving all kinds of auxiliary devices and equipment. The

degree of redundancy shall be defined in the building specification.

### D. Production Standard

A production standard which considers the special requirements for the manufacturing of naval ships has to be defined by the Shipyard and accepted by **BCS**.

### E. Documents to be Submitted for Approval

1. All documents have to be submitted to **BCS** in English language.

2. The survey of the ship's construction will be carried out on the basis of approved documents. The drawings must contain all data necessary for approval. Where required, calculations and descriptions of the ship's elements are to be submitted. Any nonstandard symbols used are to be explained in a key list. All documents have to indicate the project number and the designation of the Naval Authority and/or the name of Shipyard.

The drawings and documents have to give sufficient evidence that the requirements according to Section 1, B. and E. are complied with.

### C,D,E

3. Calculations shall contain all necessary information concerning reference documents (parts of the specification, relevant drawings, etc.). Literature used for the calculations has to be cited, important but not commonly known sources shall be added in copy.

The choice of computer programs according to "State of the Art" is free. It is recommended to use computer programs which are accepted by **BCS** as appropriate to solve the actual problems. If the computer programs to be used are not known to **BCS**, they may be checked by **BCS** through comparative calculations with predefined test examples. Reference applications, already achieved acceptance by other institutions and other relevant

Serial No.	Description
	<b>General Requirements</b>
1	General arrangement plan
2	Deck plan
3	Technical specification
4	Lines Plan
5	Material specification for hull
6	List of submitted drawings
	<b>Hull Structures and Ship Equipment</b>
	<b>Hull</b>
	Midship section
7	Other typical sections
8	Bottom structure
9	Engine room structure (including engine foundations)
10	Shell expansion plan
11	Ice strengthening
12	Decks
13	Superstructures and deckhouses
14	Bulkheads
15	Tank arrangement plan
16	Rudder body
17	Rudder stock
18	Rudder bearings, pintles and couplings, etc.
19	Large openings
20	Special foundations
21	Welded joints for steel or aluminium
22	Coating plan
23	NDT-plan (Non-Destructive-Testing)
24	Equipment number and anchoring equipment
25	Mooring equipment
26	
	<b>Supporting Calculations (Structure)</b>
	Design loads summarized in a load plan
27	Distribution of still water shear forces and bending moments
28	Longitudinal strength calculation
29	Geometry properties of significant hull girder cross sections
30	Local stress calculations, if applicable
31	Finite element analysis, if applicable
32	Fatigue stress calculations, if applicable
33	Shock calculations, if applicable
34	Residual strength, if applicable
35	

information shall be provided in advance. A generally valid approval for a computer program is, however, not given by **BCS**.

The calculations have to be compiled in a way which allows identifying and checking all steps of the calculations in an easy way. Hand-written, easily readable documents are acceptable.

Comprehensive quantities of output data shall be presented in graphic form. A written comment to the

main conclusions resulting from the calculations has to be provided

4. The detailed requirements for the documentation are shown in Table 4.1.

5. **BCS** reserve the right to request additional documentation if the submitted one is insufficient for an assessment. This may especially be the case for plants and equipment related to new developments and/or which are not tested on board to a sufficient extent.

6. The drawings are to be submitted in triplicate and all calculations and supporting documentation in one copy for examination. All documents are to be submitted at a sufficiently early date to ensure that they are approved and available to the Surveyor at the beginning of the manufacture or installation of the ship or of important components.

E

7. Once the documents submitted have been approved by **BCS** they are binding for the execution of the work. Subsequent modifications and extensions require the approval of **BCS** before becoming effective.

8. For classification of a naval ship the following documents have to be submitted, as far as applicable. **BCS** reserve the right to request additional information and documentation depending on ship's type and Naval Authority's requirements.

**Table 4.1 Documentation to be submitted for classification**

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**Table 4.1 Documentation to be submitted for classification (cont.)**

Serial No.	Description
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	<b>Safety Requirements for the Hull</b>
36	Closing appliances
37	Information to calculation of freeboard
38	Bulwarks and guard-rails
39	General stability information
40	Intact stability calculations
41	Damage stability calculations
42	Damage control plan
43	Inclining test, report and evaluation
44	Structural fire protection
45	Documentation on storage rooms and transport lines for explosives (ammunition, missiles, etc.)
46	Rigging plan
47	Masts
48	Specification of standing rigging
49	Specification of further equipment
	<b>Machinery Installations General Layout</b>
50	General arrangement of machinery spaces
	<b>Internal Combustion Engines</b>
51	Data on main parameters for each type of internal combustion engine to be used
52	Detailed drawings of the complete engine, including cross/longitudinal sections
53	Documentation on provisions or additional equipment for low load operation of the engines, if applicable
	Documentation on changes to already approved types of engines
54	<b>Gas Turbines and Exhaust Gas Turbochargers</b>
	Assembly drawings and cross sections
	Detailed drawings of main components
55	Documentation on the fuel and lubricating systems (incl. circuits, control and safety devices)
56	Documentation on the starting system
57	Data concerning operation conditions
58	Proof of sufficient safety for critical components (incl. results of trials on turbine components)
59	Data concerning welding conditions for welded components
60	
61	<b>Power Transmission and Propulsion Systems</b>
	General drawings of the entire shafting
	Component parts transmitting torque (shafting, couplings, bearings, etc.)
62	Stern tube arrangement
63	Cast resin mount
64	Shaft alignment calculation
65	Assembly and sectional drawings of gears and couplings (calculations, parts list)
66	Design drawings of propellers in main propulsion (for engine output in excess of 300 kW)
67	Design drawings of transverse thrust systems (for engine output in excess of 100 kW)
68	General drawings, sectional drawings and functional characteristics of controllable pitch propeller unit
69	Rudder propeller/Podded drives
70	
71	<b>Other Documents</b>
	Operation and maintenance manuals, if required
	Spare parts list
72	Trial programs (FAT, HAT, SAT)
73	
74	

Table 4.1 Documentation to be submitted for classification (cont.)

Serial No.	Description
	<b>Electrical Installations</b>
	<b>Power Plant</b>
75	Details of the scope and type of electrical plant
76	Details about the construction of electrical equipment in hazardous areas
77	General layout for electrical power generation and distribution
78	Details on generators and UPS units
79	Details on hazardous areas
80	Short circuit calculation
81	Electrical power balance
82	Details on main and emergency switchgear, main distribution boards
83	Details on lighting network
84	Details on feeding of weapons and sensors
85	Details on concept to avoid radiation hazards
86	Documentation on switch gear, monitoring and controls for the refrigerating plant
87	Main cableways for different voltage systems
88	Details on electromagnetic compatibility measures
89	Bulkhead/deck penetrations
90	Cable layout/-list
	<b>Manoeuvring System</b>
91	Details on steering gear drive and control systems
92	Details on rudder propeller and lateral thrust system
93	Controllable pitch propeller system, if applicable
94	Details on dynamic positioning system, if applicable
	<b>Lighting</b>
95	Lighting arrangement
96	Documentation on light fittings and sockets used
	<b>Control and Alarm System</b>
97	Monitoring and safety systems for machinery
98	Starting arrangements for main and auxiliary engines
99	Control and regulation for essential equipment and drives
100	Documentation on general and special alarm systems
101	Documentation on position and navigation lights
102	Documentation on fire and CO <sub>2</sub> alarm system
103	Documentation on watertight and fire door operation and position monitoring system
104	Documentation on tank level indicators, alarms, shut-off facilities
105	Documentation on gas and NBC (nuclear-biological-chemical) detection systems
106	Documentation on all essential intercommunication systems
	<b>Board Computer</b>
107	Hardware and software documentation on computers (as relevant for classification)
	<b>Propulsion</b>
108	Electrical propulsion plants
	<b>Automation</b>
109	General layout
110	Software documentation
111	List of sensor types and location
112	Concepts for protection
113	Details of bridge arrangement

E

Table 4.1 Documentation to be submitted for classification (cont.)

Serial No.	Description
	<b>Other Documents</b>
114	Operation and maintenance manuals, if required
115	Spare parts list
116	Trial programs (FAT, HAT, SAT)
	<b>Auxiliary Systems and Equipment</b>
	<b>Pressure vessels</b>
117	List of pressure vessels and equipment
	<b>Steam Boilers</b>
	Design drawings for all pressurized parts of the steam boiler
118	Documentation on strength calculations
119	Documentation on types and location of the fittings of the boiler
120	Description of the installation of the boiler plant in the naval ship
121	Cross sections of every burner type to be used
122	
	<b>Tanks and piping</b>
	Details on fuel and oil tanks
123	Diagrammatic plans of all piping systems
124	Details on remotely controlled valves
125	Replenishment at sea system
126	Manipulation systems, lifts, etc.
127	Aircraft handling system
128	
	<b>Fire extinguishing systems</b>
	Diagrammatic plans, detailed drawings and documents for:
	Water fire extinguishing equipment
	CO <sub>2</sub> fire extinguishing system, if applicable
129	Foam extinguishing systems
130	Details of all other fire fighting systems and equipment
131	Fire control plan
132	
133	
	<b>Equipment</b>
	Assembly and general drawings, diagrams of hydraulic and electrical equipment, details of all important load transmitting components for:
	Steering gear
	Rudder propeller units
134	Anchor windlasses
135	Fire door control system
136	Replenishment at sea system
137	Manipulation systems
138	Aircraft handling system
139	Hydraulic systems for special devices, if safety-relevant
140	
141	<b>Other Documents</b> (for sub-systems and components)
	Operation and maintenance manuals, if required
	Spare parts list
	Trial programs (FAT, HAT, SAT)
142	
143	
144	